UNIVERSAL IMMUNIZATION COVERAGE

NATIONAL INSTITUTE OF COMMUNICABLE DISEASES
(DIRECTORATE GENERAL OF HEALTH SERVICES)
22-SHAM NATH MARG, DELHI-110054

1985

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(A Report of the National Course on Planning and Management of Expanded Programme on Immunization held at NICD in January 1985)

COMMUNITY HEALTH CELL

Editor
R.N. BASU
Director, NICD, Delhi

NATIONAL INSTITUTE OF COMMUNICABLE DISEASES
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PREFACE

A national workshop on planning and management of Expanded Programme on Immunization (EPI) was held at National Institute of Communicable Diseases (NICD) for professors of medical colleges from 7-16 January, 1985. This book is a report of the workshop. It is necessary to involve the medical colleges in supporting the national immunization programme. They can contribute in training of personnel, surveillance of diseases, evaluation studies and health services research. Moreover, the medical colleges will participate in intensification of immunization programme in three primary health centres (field practice), and urban areas where the institutions are located. This will be the beginning of accelerated immunization coverage for all the infants in districts.

Apart from use of the standard modules on EPI, experiences were shared, problems were identified with possible solution and future directions were reviewed in this workshop. The lead article of Mr. R.P. Kapoor, Additional Secretary and Commissioner (FW) captures essentials on the universal immunization coverage. The year 1990 is rapidly approaching and immunization coverage, though rising, remains low. Raising coverage levels to the point where significant reduction in morbidity and mortality can be sustained, remains a formidable challenge. This report has made an attempt to convey this message. The approach used by the participants should lead to an evolution of methodology resulting in total coverage in wider areas.

Preparing a careful plan for activities at different levels is a pre-requisite for accelerating immunization activities. This plan should specify—who should be involved and how, what resources are available and what inputs are required to sustain the activities. In this publication, the international and bilateral agencies and the areas where additional inputs are available, have been indicated to mobilize reaources. Vaccination coverage survey, using cluster sampling technique has been

stressed in this book. Number and areas of survey should be scheduled in such a way that the results can be representative for a larger administrative areas. These surveys could also be used as a supervision tool, for training and as a mission to determine reasons for immunization failure. Such a survey was carried out in Delhi Municipal Corporation areas as a field exercise.

The participants brought along with them a review of studies on immunization conducted in their areas. Three articles related to Pondicherry have been presented, which have discussed introduction of new vaccine (measles) and wide coverage in urban and rural areas. An exercise on estimation of requirement of vaccines, sentinel surveillance in India and institutional support for EPI discussed in this document will be useful not only for training centres/medical colleges but also to state and district level programme officers. The tasks of EPI have been reviewed at the end, which have liberally drawn materials from different sources.

I am grateful to Dr. D.B. Bisht, Director General of Health Services for his continuous guidance and support to all activities of NICD and his active interest in EPI. Sincere appreciation and thanks are due to Dr. P.N. Sehgal, Deputy Commissioner (MCH) for all the cooperation and assistance in organizing the course. Assistance of Dr. S.N. Ray, Deputy Director, Dr. Subhash Chakraborty, Senior Medical Officer and other colleagues are thankfully acknowledged for getting the report printed within a short time. World Health Organization (WHO) has provided the modules and fund to organize the workshop. I express my gratitude to all for their contribution.

May, 31, 1985

R. N. Basu

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1. Universal Immunization Coverag

R.P. Kapoor*

1.1. INTRODUCTION

National effort in health care during 36 years of our independent existence has witnessed a rapid decline in mortality rate from 27.4 in 1951 to 12.5 per thousand population in 1981. Infant mortality rate has been reduced from 210 to 114 per thousand live births. The decline in infant motality rate is not proportional to the reduction in crude death rate. The current infant mortality rate is unacceptably high. National health policy aims at bringing down the infant motality rate below 60 per thousand live births by 2000 A.D. A package of programme including wholesome maternity service, child spacing, home-based child care, promotion of breast feeding, immunization, home management of diarrhoea, nutrition are necessary to ensure child survival. Child is a precious person and whatever births take place, the welfare workers are interested to ensure their long and healthy life.

1.2. IMMUNIZATION PROGRAMME

Immunization has become a programme of unusual priority. Immunization, alone, can make a big difference to infant mortality and morbidity and disability during childhood. Neonatal tetanus is an important cause of infant deaths. Poliomyelitis is the single major cause of lameness of children. Whooping cough and Measles leads to several complications many of which are fatal. Immunization programme is a long term ongoing programme and is an important component of the primary health care services. Immunization is highly cost-effective for the control of the infectious diseases like diphtheria, whooping cough, poliomyelitis, tetanus, chilhood tuberculosis, measles and typhoid, which at present constitute the major health problems in the country. The national health policy aims to achieve

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universal immunization coverage of the eligible population by 1990.

Progress in immunization coverage has of course been achieved but is not enough in relation to the tasks ahead. The approach has to be on an emergency footing because of short time available. The task is easier said than done and it is a long journey for attaining success. The task involves vaccinating 18 million new-borns and 22 million expectant mothers every year. With different antigens used, this may mean 132 million contacts for primary vaccination annually. This is a formidable task to be performed within the existing health infrastructure. But the country has made the commitment to implement the universal immunization programme and an operational strategy has been developed. All relevant resources of government have to be mobilised and applied.

1.3. OBJECTIVES

The objectives of universal immunization coverage is tc have 85% vaccination of all new-borns with three doses of DPT, three doses of polio and one dose of BCG vaccine by first year of birth day. Measles vaccine will be introduced in the national programme and one dose will be administered between 9-12 months of age. All pregnant women will receive two or booster dose of tetanus toxoid. This coverage will be reflected in the lowering of neonatal mortality rate as well as the number of orthopedically handicapped children. The objectives also includes reduction of neonatal tetanus mortality rate to less than 1 per 1000 live births and reduce the poliomyelitis incidence rate to less than 0.5 per hundred thousand population. Cooperation and active involvement of the Ministries of Social Welfare, Rural Development, Education, Information and Broadcasting, voluntary organizations and international agencies will be sought and encouraged for total immunization coverage. The important objective is to generate people's demand for immunization by involving the community.

1.4. PHASING OF UNIVERSAL COVERAGE

It is proposed to take up the programme in selected 30 districts (located in 17 states) and 50 medical colleges (list in Annex 1 and 2), where universal immunization coverage will be aimed by 1988. High vaccination coverage during a short

period of time will lead to rapid and demonstrable reduction in the incidence of vaccine preventable diseases. The success stories in these areas will stimulate extension of purposeful activities in other areas. The majority of the districts (23 out of 30) selected are covered by special area project scheme where infrastructure in the from of manpower, buildings and other resources have been provided. In the medical colleges, emphasis will be given in the catchment areas of three primary health centres (PHC) covered by them and an urban population of nearly 5 lakhs. The scheme covers 47% of the medical colleges in the country and are distributed in 20 states and union territories. It is proposed to utilise the huge manpower of medical students for immunization coverage in the practice field of the colleges. Additional inputs, especially in terms of health manpower, vaccine and mobility will be provided to these districts and medical colleges so that accelerated pace and enlarged coverage is achieved.

1.5. TASKS INVOLVED

Management of the universal immunization programme will lay a considerable stress on maintenance of supply line, strengthening the cold chain, development of human resources, operational research, comprehensive implementation of the programme, systematic monitoring and concurrent evaluation of the programme. Special attention has to be paid for increasing the capacity of production of various vaccines so that the country is self-sufficient to meet its requirements. Vaccine handling has to be improved by proper maintenance of cold chain equipments from manufacturer to periphery and supervision of transport of vaccines. Mobility of the concerned staff is essential for providing a coverage in areas remote from the health centre or sub-centre. Appropriate training to different category of health workers including multipurpose workers and health supervisors, is one of the important pre-requisites for this massive operation. Operational research for further improvement in the services to explore and support alternative methods of organizing the programme will be encouraged. Success of the programme will be evaluated in terms of the coverage of the eligible population with the full course of the vaccines and the impact on the disease incidence.

1.6. ROLE OF MEDICAL COLLEGES

The institutional support is an important component for successful implementation of the national programmes. In the field of agriculture, agricultural universities are playing an important role in extension of the innovative practices in the farm. The medical colleges, apart from acting as a partner in implementation of the immunization programme, can take up several other activities. The medical colleges has to take the responsibility of the training of the district level supervisors, so that they become functionaries to guide the implementation of the programme in the primary health centre. The colleges can assist the state health authorities in organizing vaccination coverage survey to monitor the vaccination performance. This is considered important as children of the right age group should be vaccinated with completed dosage schedule. The ultimate objective of the immunization programme is to reduce the morbidity and mortality and it is necessary to monitor this impact by using appropriate surveillance techniques. The medical colleges are the appropriate institutions which can carry out this type of work.

1.7. STRATEGIES

Appropriate and combined strategies will be adopted depending on local conditions and feasibility. Some of the strategies are—

i) Daily, biweekly, weekly or monthly session at hospitals, dispensiaries and maternity and child health (MCH) clinics in urban areas and PHCs and sub-centres in the rural areas. These centres should have adequate cold storage facilities or the vaccines can be carried to these centres on the day of vaccination sessions;

ii) Organization of out-reach operations to villages surrounding the health centres beyond 5 km. Vaccines will be carried in vaccine carriers on the day of vaccination session;

iii) Vaccination of the eligibles on a campaign basis within a period of three to four months by mobilizing all resources.

It has to be noted that, immunization services will be continued in subsequent years in all parts of the country.

1.8. INPUTS

Ministry of Health and Family Welfare has assessed the requirement of inputs and has taken necessary steps for its deployment. Additional staff have been sanctioned at the central and state level, especially to supervise the vaccine distribution and cold chain. With the assistance from UNICEF, each district will be supplied a walk-in-cooler for storage of vaccine and deep freezer for making ice pack. It will be ensured that one refrigerator is available in each P.H.C. The required quantities of vaccines will be supplied either through increased production or procurement from abroad. Training of personnel on continuous basis will be arranged in collaboration with medical colleges and Regional Health and Family Welfare Training Centres. Additional jeep will be provided for mobile operations and funds for syringes and needles, immunization card, health education materials, contingency etc. will be available. Evaluation and surveillance will be organized in collaboration with national institutes and state health authorities.

Annex 1.1.

List of Districts for Universal Immunization Programme (in first phase)

Sl. No.	*State*	*District*	*Population (In lakhs)*	*Special Project*
1.	Andhra Pradesh	Chittoor	27.3	World Bank
2.	-Do-	Cuddapah	19.3	"
3.	Bihar	Katihar	14.2	UNFPA
4.	-Do-	Purnea	35.9	"
5.	Gujarat	Kheda	30.1	—
6.	-Do-	Bharuch	12.9	USAID
7.	Haryana	Kurukshetra	11.3	—
.8	Assam	Kamrup	28.5	—
9.	Himachal Pradesh	Sirmaur	3.1	USAID
10.	-Do-	Hamirpur	3.2	"
11.	Jammu & Kashmir	Anantnag	6.6	—
12.	Karnataka	Bidar	9.95	World Bank
13.	-Do-	Belgaum	29.8	"
14.	Kerala	Palghat	20.4	"
15.	-Do-	Idukki	9.7	"
16.	Madhya Pradesh	Sagar	13.2	DANIDA
17.	-Do-	Gwalior	11.1	"
18.	Maharashtra	Nasik	29.9	—
19.	-Do-	Osmanabad	22.3	USAID
20.	Orissa	Puri	29.2	U.K.
21.	-Do-	Cuttack	46.3	"
22.	Punjab	Sangrur	14.1	USAID
23.	-Do-	Bhatinda	13.0	"
24.	Rajasthan	Kota	15.6	UNFPA
25.	-Do-	Bharatpur	18.8	"
26.	Tamil Nadu	Madurai	45.3	—
27.	-Do-	Salem	24.4	DANIDA
28.	Uttar Pradesh	Varanasi	37.0	World Bank
29.	-Do-	Deoria	34.9	"
30.	West Bengal	Nadia	20.6	—
		Total:	634.00	

Annex 1.2

List of Medical Colleges for Universal Immunization Programme

Sl. No.	*State*	*Medical College*
1.	Andhra Pradesh	Osmania Medical College, Hyderabad.
2.	-Do-	Medical College, Vishakhapatnam.
3.	-Do-	S.V. Medical College, Tirupati.
4.	Assam	Medical College, Gauhati.
5.	-Do-	Medical College, Dibrugarh.
6.	Bihar	P.W. Medical College, Patna.
7.	-Do-	Medical College, Ranchi.
8.	Gujarat	B.J. Medical College, Ahmedabad.
9.	-Do-	M.S. Medical College, Baroda.
10.	-Do-	M.P.S. Medical College, Jamnagar.
11.	Haryana	Medical College, Rohtak.
12.	Himachal Pradesh	Medical College, Simla.
13.	Jammu & Kashmir	Medical College, Jammu.
14.	-Do-	Medical College, Srinagar.
15.	Karnataka	St. Johan's Medical College, Bangalore.
16.	-Do-	Kasturba Medical College, Manipal.
17.	-Do-	Medical College, Mysore.
18.	Kerala	Medical College, Trivandrum.
19.	-Do-	Medical College, Kottayam.
20.	Madhya Pradesh	G.R. Medical College, Gwalior.
21.	-Do-	M.G.M. Medical College, Indore.
22.	-Do-	Medical College, Jabalpur.
23.	-Do-	Medical College, Raipur.
24.	Maharashtra	G.S. Medical College, Bombay.
25.	-Do-	T.N. Medical College, Bombay.
26.	-Do-	V.M. Medical College, Sholapur.
27.	-Do-	Armed Forces Medical College, Pune.
28.	-Do-	Medical College, Nagpur.
29.	Orissa	Medical College, Cuttack.
30.	-Do-	Medical College, Berhampur.
31.	Punjab	Medical College, Amritsar.
32.	-Do-	Medical College, Patiala.
33.	-Do-	Christian Medical College, Ludhiana.
34.	Rajasthan	S.M.S. Medical College, Jaipur.
35.	-Do-	Medical College, Jodhpur.
36.	-Do-	Medical College, Ajmer.
37.	Tamil Nadu	Institute of Child Health, Madras.
38.	-Do-	Medical College, Madurai.
39.	-Do-	Medical College, Coimbatore.
40.	Uttar Pradesh	K.G. Medical College, Lucknow.
41.	-Do-	Institute of Medical Sciences, Varanasi.
42.	-Do-	Medical College, Allahabad.
43.	-Do-	G.S.V.M. Medical College, Kanpur.

44.	-Do-	Medical College, Meerut.
45.	West Bengal	R.G. Kar Medical College, Calcutta.
46.	-Do-	All India Institute of Hygiene and Public Health, Calcutta.
47.	Delhi	Maulana Azad Medical College, New Delhi.
48.	-Do-	Lady Hardinge Medical College, New Delhi.
49.	Goa	Medical College, Goa.
50.	Pondicherry	J.I.P.M.E.R., Pondicherry.

2. AREA PROJECT SCHEME*

2.1. INTRODUCTION

To give a fillip to the health care delivery system, particularly in the backward areas of the country, 63 districts (out of 423 in the country) distributed in 14 states (out of 22) have been taken up for intensive development of health and family welfare infrastructures and expansion of services. Each district is called as 'Area Project' and assisted by an external agency. The list of districts with source of assistance can be seen in Annex I, which will benefit about 18% of the population of India. The broad objective of the project is to increase and strengthen the facilities and manpower for delivery of health and family welfare services in an integrated manner. The specific objective of these projects are (a) reduction of tertility and (b) reduction of maternal and child mortality. Ultimately, it is proposed to cover the entire country through the planning machinery of the Government of India.

2.2. INPUTS OF THE PROJECT

The following inputs are being provided.

2.2.1. Manpower

— One Health Guide and one trained Dai (birth attendant) in every village (1000 population).

— One male and one female multi-purpose worker (MPW) for each sub-centre (5000 population).

— One male and one female supervisor who are called Health Assistant (H.A.) for every four male and four female MPW.

2.2.2. Building

— Construction of sub-centres with quarters for MPW (female and H.A. (female).

— Construction for upgrading primary health centres (PHC),

* Prepared on the basis of material provided by Dr. M.A. Owaing Assistant Commissioner, Department of Family Welfare, Government of India—Editor

with provision of operation theatre, 10 beded ward, quarters for medical and para-medical staff.

— Construction of hostel MPW (F) training schools.

2.2.3. Training

— Improving the managerial skills of PHC doctors, district supervisors and para-medical personnel through proper training at appropriate institutes.

— Improving the information, education and communication (I.E.C.) system by training of extension staff like district media officers, district extension educators and block extension education.

2.2.4. Evaluation

— Evolving an appropriate management, information and evaluation (M.I.E.) system for monitoring of the programme of the peripheral units and providing feedback.

— Undertaking a baseline survey for evaluation of the effect of project inputs in subsequent years.

2.3. PROGRESS OF THE PROJECT

The project is of five years duration, following which the states will have to bear the cost of expanded services. Five donor agencies are participating in this scheme.

Donor Agency	*No. of Districts covered.*	*Commencement of scheme*	*Financial implication.*
World Bank	9 (A.P. and U.P.)	April, 1980	Rs. 82 crores
	10 (Karnataka and Kerala)	April, 1984	Rs. 120 crores
DANIDA	10 (M.P. and Tamil Nadu)	Nov., 1981	Rs. 32 crores
U.K. O.D.A.	5 (Orissa)	August, 1980	Rs. 40 crores
U.N.F.P.A.	4 (Rajasthan)	July, 1980	Rs. 70 crores
	11 (Bihar)	January, 1981	
USAID	11 (Punjab, Haryana, H.P. and Maharastra)	August, 1980	Rs. 52 crores

There is an Area Project Division in the Department of Family Welfare, Government of India, which is monitoring the progress of construction activities and training programme carried out in the districts. In every state, there is a special officer, who is overviewing the implementation of various of schemes in the periphery. Though the achievements are behind the time

schedule in most of the States, it is expected that major work will be completed before termination of the project.

2.4. IMMUNIZATION PROGRAMME

The area project district health authorities are not waiting for completion of construction of buildings or appointment of full quota of staff for improvement of delivery of health services. They have identified the area of immunization programme for acceleration from now onwards. This is evident from the various activities like workshop on EPI, training programme of medical officers and paramedicals of the districts, procurement of cold chain equipment from their own budget, organizing special programme for immunizing eligible children and many others in the Area Project Programme. In collaboration with UNICEF, a programme of universal immunization had been initiated in Bidar district of Karnataka and Dewas of Madhya Pradesh in 1983. Higher achievement of operational target of vaccination have been reported from most of Area Project districts in the states. In the first phase of universal immunization programme by 1988, 23 Area Project districts have been included. Immunization will be made a priority component in the remaining 40 districts, which have potentialities for early success.

Annex 2.1.

AREA PROJECT DISTRICTS

State	*District*	*Project*	*Population (in lakhs)*
Andhra Pradesh	Anantpur	World Bank	25.5
	Chitoor	"	27.3
	Cuddapah	"	19.3
Bihar	Monghyr	UNFPA	33.2
	Santhal Pargana	"	37.2
	Saharsa	"	29.5
	Purnea	"	35.9
	Bhagalpur	"	26.2
	Katihar	"	14.2
	Madhopura	"	9.6
	Sahibganj	"	10.8
	Godda	"	7.1
	Deogarh	"	7.1
Gujarat	Panchmahal	USAID	23.2
	Bharuch	"	12.9
Haryana	Bhiwani	USAID	9.2
	Sirsa	"	7.1
	Mohindergarh	"	9.6
Himachal Pradesh	Kangra	USAID	9.9
	Hamirpur	"	3.2
	Srimur	"	3.1
Karnataka	Belgaum	World Bank	29.8
	Bijapur	"	24.0
	Gulbarga	"	20.8
	Bidar	"	9.9
	Raichur	"	17.8
	Dharwar	"	29.5
Kerala	Wynad	World Bank	5.5
	Idukki	"	9.7
	Malapuram	"	24.0
	Palghat	"	20.4
Madhya Pradesh	Sagar	DANIDA	13.2
	Tikamgarh	"	7.4
	Gwalior	"	11.1
	Morena	"	13.0
	Shivpuri	"	8.7
	Guna	"	10.0
	Bhind	"	9.7
	Datia	"	3.1

State	*District*	*Project*	*Population (in lakhs)*
Maharashtra	Osmanabad	USAID	22.3
	Parbhani	"	18.3
	Latur	"	
Orissa	Cuttack	U.K.	46.3
	Ganjam	"	26.7
	Kalahandi	"	13.4
	Puri	"	29.2
	Phulbani	"	7.2
Punjab	Bhatinda	USAID	13.0
	Faridkot	"	14.4
	Sangrur	"	14.1
Rajasthan	Bharatpur	UNFPA	18.8
	Swai Madhopur	"	15.4
	Kota	"	15.6
	Dholpur	"	0.3
Tamil Nadu	South Arcot	DANIDA	42.0
	Salem	"	34.4
Uttar Pradesh	Deoria	World Bank	34.9
	Ghazipur	"	19.4
	Mirzapur	"	20.4
	Varanasi	"	34.9
	Basti	"	35.8
	Azamgarh	"	35.4

3. INTEGRATED CHILD DEVELOPMENT SERVICES

B.N. Tandon*

The scheme of integrated Child Development Services (ICDS) was suggested by an expert committee in 1972. Planning Commission approved ICDS Scheme on an experimental basis in 33 pilot projects in 1975.

3.1. OBJECTIVES

i) To improve the nutritional and health status of children in age group 0 to 6 years;
ii) To lay the foundation for proper psychological, physical and social development of the child;
iii) To reduce the incidence of mortality, morbidity, malnutrition and school drop-outs;
iv) To achieve the effective coordination of policy and implementation amongst various departments to promote child development; and
v) To enhance the capacity of the mother to look after the normal health and nutritional needs of the child through proper nutrition and health education.

3.2. BENEFICIARIES OF ICDS

The unit for the location of ICDS projects are community development blocks in rural areas, the tribal development blocks in tribal areas and ward areas of slums in urban areas. Priority is given to the following factors at the time of selection of projects:

— Areas predominantly inhabited by tribes particularly backward tribes, the backward and drought prone areas, nutritionally deficient areas and areas poor in development of social services.

* Chairman, Central Technical Committee, ICDS; and Professor of Gastroenterology & Human Nutrition, All India Institute of Medical Sciences, New Delhi-29.

— The services are provided to children below the age of 6 years. This is based on the consideration that preschool age is the most important phase of the human development.

— The mother has a key role in the physical, psychological and social development of the child. Thus ICDS beneficiaries include the nursing and expectant mothers and also the women in the reproductive age group.

3.3. THE SERVICES DELIVERED TO THE BENEFICIARIES

The delivery of the services to the beneficiaries is as follows:

Beneficiary	*Services*
i) Expectant and nursing mothers	(i) Health check-up
	(ii) Immunization of expectant mother against tetanus
	(iii) Supplementary nutrition
	(iv) Nutrition and health education
ii) Other women 15-45 years	(i) Nutrition and health education
iii) Children less than 1 year	(i) Supplementary nutrition
	(ii) Immunization
	(iii) Health check-up
	(iv) Referral services
iii) Children 1-3 years	(i) Supplementary nutrition
	(ii) Immunization
	(iii) Health check-up
	(iv) Referral services
v) Children between 3-6 years	(i) Supplementary nutrition
	(ii) Immunization
	(iii) Health check-up
	(iv) Referral services
	(v) Non-formal preschool education

3.4. ORGANISATION OF SERVICES

The services are rendered by Anganwadi worker (AWW) located at an Anganwadi centre for a population of 1000 in rural areas and urban slums and 700 in tribal areas. She is an honorary worker with VIII/X class qualification. She is selected from the community she is expected to serve. She is paid an honorariun of Rs. 200/- to Rs. 250/- per month. She undergoes training in various aspects health, nutrition, child development

and non-formal education for four months. the Anganwadi worker is assisted in every centre by a Helper who is responsible for cooking and distribution of supplementary nutrition.

These crucial village level workers are supervised by Mukhyasevikas who are graduates in social sciences and are full time workers of social welfare department. At the project level the Child Development Project Officer (CDPO) is responsible for all administrative functions within the ICDS block. In each project, certain additional health inputs in the form of a medical officer, Lady Health Visitor (LHV) and ANM are given from social welfare departments to facilitate the health functions of the primary health centre and subcentres of the ICDS block. However, from 1982-83 this facility is given from the health departments under family welfare or multi purpose worker (MPW) schemes, in case of rural and tribal ICDS blocks.

To co-ordinate the health components of the programme, the Chief Medical Officer or any of the senior district health officers dealing with public health activities is designated as Adviser for 2-3 ICDS blocks in the district.

ICDS is a unique programme in the health and social welfare sector in which several senior faculty members of the departments of Paediatrics, Community Medicine and Obstetric and Gynaecology from 70 medical colleges are involved as consultants. The functions of these consultants are as follows:

i) Orientation and training of the district level and PHC level health functionaries through two days and five days orientation training course, respectively.
ii) Conduct annual evaluation studies on national and state level patterns during the period October to December every year.
iii) Conduct various research studies on birth and death recording, follow-up of severe malnutrition, mortality and morbidity in ICDS blocks.
iv) To provide feed back to the health departments of the respective states through the state quarterly meeting and informal meetings in the Directorate of Health Services and through their action oriented report on the annual evaluation studies.
v) To assist health staff in the district and PHC for creating the community awareness to the services of ICDS

through district level seminars, participation of students, interns and postgraduates in immunization camps and continuing education of field level functionaries.

vi) Assist various training institutions for Anganwadi workers, trainners of Anganwadi workers, Mukhyasevikas, CDPOs by giving lectures on health and nutrition aspects of ICDS.

3.5. EVOLUTION AND EXPANSION

During last 9 years ICDS has been expanding continuously. It has established itself as a major national programme. The objectives, beneficiaries and the services have not changed. However, the role of functionaries on the health side has been undergoing modifications to fulfill the needs of the expanded programme. From 33 projects, comprising of 17 rural, 12 tribal and 4 urban in 1975-76, with an effective coverage of about 2.5 million people, the programme has now expanded to 571 rural projects, 308 tribal projects and 134 urban projects making a total of 1013 ICDS projects in the country. These projects are today covering about 75,000 villages and 134 different urban slum areas.

With further expansion the strategy of the involvement of academicians had to be modified. For the day to day monitoring and continuing education of the field level functionaries, the medical officers from the district headquarters who may be civil surgeon or district health officer or any other senior health officials with public health responsibilities are designated as Advisor for the ICDS blocks in the districts. Today there are about 400 advisors performing this function in all the states and union territories of the country. In addition to advisors from districts and consultant from medical college senior officials of the health department are appointed as State Coordinator. At some places, the State Coordinator is supported by a senior official usually an eminent health administrator or a child specialist of a medical institution.

3.6. IMMUNISATION IN ICDS PROJECT

Health is an important component of ICDS package and immunisation being an important service for positive health,

has received due emphasis. Health Departments have been very keen tp prevent communicable diseases through immunization of children and pregnant women. Expanded programme on immunization was started by Health & Family Welfare Departments in January, 1978 to cover maximum number of target groups. Information on immunization coverage through ongoing activities of the health departments is presented in table 3.1. This data has been obtained by surveys carried out by ICDS consultants (faculty members of Medical Colleges) in projects selected for ICDS but waiting for implementation of the programmes. Data shows that EPI has significantly improved the coverage for DPT, Polio and T.T.

Table 3.1. *Percentage immunisation coverage in projects selected for ICDS (Baseline Survey)*

Immunization Year	*1976*	*1979*	*1982*
BCG	21.0	17.4	25.5
DPT (× 3 dose)	4.9	14.0	18.3
Polio (× 3 dose)	N.R.	9.2	16.4
T.T. (× 2 dose) (pregnant women)	6.0	N.R.	16.8
Children Surveyed	27726	27487	13074
Project Sampled	23	33	19

N.R.—Not Recorded.

What are the inputs from ICDS for immunization programme? It must be clearly understood that immunization is primarily the responsibility of MCH programme of Ministry of Health and Family Welfare and ICDS offers strong support for immunization programmes by certain well defined functions of its workers which are as follows:

i) *LISTING*: Keeping the list of target population i.e. less than 6 years old children of different age groups (including new-born) and pregnant women at each village which corresponds to AW. Their immunization status is also recorded. Thus health teams know who need to be immunised in each village.

ii) *MOTIVATING*: A.W.W. is in continuous touch with parents and children and does her best to ensure that when teams for immunization come to the village it gets maximum cooperation and least resistance.

iii) *FOLLOW UP FOR REACTIONS*: Being a resident of the same village A.W.W. is able to follow up any immunization reaction and its management including advise from ANM/MPW (F).

iv) *MONITORING*: System of functional monthly and quarterly monitoring helps in undertaking frequent corrective measures to ensure maximum coverage with minimum side effects.

v) *SURVEY*: Keeps on providing unbiased independent external evaluation data on immunization coverage. This keeps the health department informed how close or near they are to their target for immunization.

vi) *CONTINUED EDUCATION*: at sectorial level keeps up the enthusiasm and improves the professional quality of ANM MPS (F) and AWW.

Is immunization performance better in ICDS projects compared to non-ICDS Blocks?

The answer is YES. It is based on monitoring and evaluation data. Survey by ICDS consultants shows considerable increase of the immunization coverage in ICDS for all types of immunization and 3 different types of population rural, tribal and urban.

Table 3.2.: *Immunization in ICDS Project–1982 survey*

Parameter	*Baseline*	*One year old ICDS project*	*More than 2 years old project*
BCG	25.5	28.8	45.6
DPT (3 doses)	18.3	29.1	43.4
Polio (3 doses)	16.4	29.8	42.7
T.T. (2 doses) (pregnant women)	16.8	32.2	
Children Surveyed	13074	8447	21587

Two interesting observations were that the benefits of immunization coverage were equally significant in tribal population (Table 3.3) and children below the age of 2 years who in fact should be the exclusive group for immunization (Table 3.4).

Table 3.3. *Immunization in Tribal ICDS projects and corresponding coverage in new projects (Baseline).*

Immunization	Coverage in percent			
	1979-80 Survey		*1982 Survey*	
	New Projects (Baseline)	*ICDS Projects (3 years old)*	*New Projects (Baseline)*	*5 Year old ICDS projects*
BCG	11.7	39.5	28.6	44.0
DPT (3 doses)	9.7	25.0	11.2	40.3
Polio (3 doses)	2.3	5.2	12.1	22.9
T.T. (2 doses) (pregnant women)	N.R.	N.R.	18.1	32.4
Children Surveyed	8291	3822	2595	2334

Table 3.4. *Immunization coverage of children below 2 years age in ICDS projects compared to baseline status (New Projects)–1982 Survey.*

Immunization	*Coverage in percent*	
	New ICDS projects (Baseline status)	*More than 2 years old ICDS Projects*
BCG	19.3	34.0
DPT (3 doses)	11.1	25.7
Polio (3 doses)	9.9	26.4
Children below 2 years age surveyed	4179	7330

What factors help to improve immunization coverage in

ICDS projects?

i) Children, their parents and social structure of the village is ready to receive immunization service due to informal but persistent effort of A.W.W.
ii) There is 'pressure' on district & PHC staff for maximum coverage of immunisation in ICDS projects.
iii) There is better supply of vaccines in ICDS blocks on priority basis.
iv) Immunisation is part of broader development programme in ICDS.
v) There is close monitoring and evaluation.

In fact with better supply and improved cold chain, immunization in ICDS blocks can achieve the targets of 2000 AD a decade earlier, i.e. by 1990.

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4. PARTNER OF IMMUNIZATION PROGRAMME—WHO*

4.1. INTRODUCTION

World Health Organization (WHO) has formulated five point action programme which indicates importance of community participation, sikIled manpower, continuous evaluation, research and adequate financial resources for EPI. These five points are:

— Promote EPI within the context of primary health care. Immunization services should be delivered with other health services, so that they are mutually supportive;

— Invest adequate human resources in EPI: Senior and mid level managers require training not only to be effective with respect to EPI, but also to contribute to the understanding and strengthening of the primary health care approach;

— Ensure that the programmes are continuously evaluated: Reliable data on immunization coverage of children and the incidence of EPI target diseases have to be collected in addition to periodic programme review·

— Pursue research efforts as part of programme operations: This will include improvement of delivery system, cold chain, vaccine, information system.

— Invest adequate financial resources in EPI: It is expected that one third of the investment will come from the international community.

The outline of collaborative activities of South East Asia Regional Office of WHO with Indian EPI are presented here, which shows that WHO has been an useful partner of the programme.

4.2. TRAINING

Training is vital for effective implementation of EPI. WHO organized inter-regional and inter-country workshops on plan-

* Prepared from diffrent background papers presented by WHO — *Editor.*

ning and management of EPI for people directly responsible the planning, supervision and evaluation. The workshop w later extended for other health staff responsible for cold chai management. The number of Indian staff, who participated in different inter-country workshops since 1978 has totalled 165.

Inter-country workshop	*Number of Indian participants*
EPI planning and Management.	85
EPI Mid level Management and Supervision	44
EPI Logistics and cold chain	25
EPI Refrigerator Repair and Maintenance	11

Awarding fellowship for training and study tour in EPI related areas is an activity of WHO in support of improving the human resources. During 1980-84, 27 officers from India availed fellowship, mostly of 8 weeks' duration. Since cadre of national senior and middle-level programme managers responsible for implementation of EPI have already been trained, WHO now encourages training of trainers at national level and health officers at state level. WHO provides the module of EPI and financial support to meet the expenditure for organizing such courses.

The national Planning and Management Courses on EPI was started in 1980. So far, 172 medical officers have attended 7 courses at the national level, which are meant for state programme officers, trainers like Principal of Health & F.W. training centres and teachers of medical colleges. They in turn organized courses at the state level for the mid-level health officers. 826 medical officers have participated in the courses organized at state level. A centre for training of technicians on the repair and maintenance of refrigerators is now functioning in Pune in collaboration with Government of India, WHO and UNICEF.

4.3. DISEASE SURVEILLANCE

Surveys have contributed significantly to the understanding of the epidemiology of vaccine preventable diseases and the serious public health impact of diseases such as measles, poliomyelitis and neonatal tetanus. WHO supported the

national combined survey to estimate the incidence of poliomyelitis and neonatal tetanus (1981-1982) and Measles Immunization Project (1980-1983). The local cost for these studies were met by WHO in addition to provision of short-term consultant to review the survey.

The survey to estimate the incidence of poliomyelitis and neonatal tetanus was carried out in 14 states of India, separately for the urban and rural areas. The surveys confirmed that poliomyelitis and neonatal tetanus were serious public health problems.

Poliomyelitis was found to be as widespread in thr rural areas as in the urban. The majority of the cases got the disease between one and two years of age.[1] The results of the surveys led to the extension of the polio vaccination programme to the rural areas and to the efforts being concentrated on the polio vaccination coverage of children under one year of age. Although neonatal tetanus was reported from all the states and union territories surveyed, the rates varied in different areas. The rates were, however, consistently higher in the rural areas as compared to the urban[2].

A measles immunization project was started in 1980 in which 35 medical colleges participated. The study included the monthly follow up of over 10,000 children over a period of 2 years. Half the children received a dose of measles vaccine at the beginning of the study. The objectives were to (i) determine how important in terms of children's health is measles in the population; (ii) what is the effect of measles vaccine on children's health; (iii) what logistical and managerial constraints could be identified with introduction of measles immunization.[3] Government of India has now decided to introduce measles vaccine in the national immunization programme during seventh five year plan.

4.4. COLD CHAIN EQUIPMENTS

Several health services research projects on cold chain are being carried out in India in collaboration with regional office of WHO. The field trial of first solar powered refrigerator installed in 1981 at Bhoorbaral PHC, Meerut was completed in July, 1984. The entire system had worked very satisfactorily during the trial period and is still operating. The major problem

with this system is the high cost of replacing the battery bank (estimated to be approximately US $ 700 every three years) besides the high initial cost of the system (about US $ 4000). The field trials on five solar powered refrigerators manufactured by Electrolux-AEG have commenced from July/August, 1984 in five states.

The local manufacturers were assisted to promote indigenous production of cold chain equipments of standard quality like cold boxes, vaccine carriers and voltage stabilizes. Cold boxes, vaccine carriers including ice packs of improved design are now manufactured in India. Prior to this, the vaccine carriers were imported and the numbers were necessarily limited to the funds available under the WHO project. A new "day carrier" holding enough vaccine for one day and having a cold life of about 20 hours has been developed. This small carrier weighs 1 kg. when fully loaded and can fit into ANM's bag. A field study is in progress in Assam to identify common spare parts for use in repair of refrigerators.

A field trial of cold chain monitors despatched along with polio vaccine in two states, Tamilnadu and Gujarat, was linked up with potency testing of vaccine. The cold chain monitor was sent along with packets of polio vaccine from the manufacturer. The monitor was followed up to primary health centre. These time-temperature indicators change colour irreversibly from white to blue when exposed to higher than 10°C over a period of time. The colour change will not progress further if the indicator is again refrigerated (at less than 10°C). It should be pointed out that the cold chain monitor cannot tell about potency of vaccine it accompanies. Thus in this trial, samples of vaccine were collected, according to the protocol, for potency testing.

4.5. OTHER AREAS OF SUPPORT

WHO supported group educational activities, preparation of health education materials and useful supplies for promotion of EPI. Annual meeting of state EPI officers, workshop on control of poliomyelitis and tetanus, and other group educational programmes were organized from the fund made available from WHO country budget for EPI. Similarly, the local cost subsidy from WHO, assisted in preparation of health education

materials for intensification of the immunization programme. A flip roll was prepared for the health workers. To make the message interesting, it was delivered in the form of a dialogue between the infant and his mother. It can be rolled into a convenient size to fit into a packet or a small handbag and is washable. Disease recognition cards have been printed for the health workers for active surveillance of these diseases.

WHO has supplied more than ten thousand vaccine carriers and dial thermometers. This has helped to introduce temperature record of the refrigerators and provision of vaccine carriers in each primary health centre. The supply of microtitre plates and foetal calf serum, which are not available in the country, has assisted in making three centres functional for potency testing of polio vaccine collected from the field. The supply of photocopier, electric-typewriter has improved the efficiency of EPI organization at central level. It is estimated that during 1984, WHO spent $ 1.53 lakhs for EPI in India.

WHO has assisted in the project of indigenous manufacture of oral polio vaccine in the country. They not only supplied the master seeds but also provided the services of a consultant to perform the neurovirulence test for type 1, II and III separately. WHO has recently informed that the Haffkine Bio-pharmaceuticals Corporation Ltd., Bombay, has reached consistency in the production of oral polio vaccine. In the field of quality control of DPT, WHO has included three public sector institutes of India, which manufacture DPT vaccine, in the regional quality control grid. The system of cross-checking which has been developed, has made the manufacturers more alert to the importance of in-process quality control.

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5. IMMUNIZING MORE CHILDREN—UNICEF*

5.1. CURRENT STATUS

UNICEF's assistance to support India's immunization programme is of great value. Supply of vaccines in time of need, expansion of the production of DPT vaccine, organisation of cold chain from the manufacturer to the primary health centre (PHC) are some of the examples of deeprooted involvement of UNICEF in the Expanded Programme on Immunization (EPI) of the country. The assistance during the sixth plan consisted of variety of important supplies:

— Central Research Institute (CRI), Kasauli, Pasteur Institute (PI), Coonoor, and lately Haffkine Bio-pharmaceutical Corporation (HBPC), Bombay have been provided with chemicals and equipments, not available in the country, to manufacture and expand production of DPT vaccine. India's self sufficiency in vaccine production is due to material contribution by UNICEF and its value was dollars 1.2 million in 1983 alone.

— The refrigerators at the PHC, deep freezer/ice-lining referigerator at district health offices, walk-in-cooler at state/regional level, airport etc have been supplied by UNICEF. They have also replaced non-functioning imported model of refrigerator at PHCs. Vans have been provided for quick transport of vaccines. For maintenance of refrigerators, training courses for technicians have been organized regularly.

— Though the country is self-sufficient in the production of DPT, TT and BCG vaccine, due to certain manufacturing and procurement problems, EPI was not able to meet the vaccine requirements of the states. On their request, UNICEF supplied these vaccines during 1984. In addition, Measles vaccine in limited quantities and pertussis concentrate are supplied by UNICEF. During 1984-85, UNICEF supplied vaccines worth Rs. 2.88 million and during 1985-86, anticipated supply will be Rs. 4.25 million.

— Other supports from UNICEF include immunization kits for multi purpose workers, paper for immunization card and health education materials. During 1984, it is entimated that UNICEF's assistance for EPI was worth Rs. 27.8 million.

5.2. OBJECTIVES AND STRATEGY

UNICEF's cooperation with the Government during 1985-89 will have an operational thrust on universal immunization of children and pregnant women throughout the country. The ultimate objectives are

- reduce the infant mortality rate from 114 to 87 by 1990.
- reduce the child (1-5 years) mortality rate from 24 to 15 by 1990.
- prevent about one million cases of disability due to poliomyelitis of 1-5 year old children, during 1985-89.
- prevent maternal deaths due to tetanus.
- achieve the immunization coverage set for 1990 by the Government.

A two-fold strategy involving interventions on the demand side as well as on the supply side will be followed.

- a package of all six vaccines will be made available throughout the country. The aim is to immunize all infants 0-12 months and all women of child-bearing age, with priority for pregnant women.
- special emphasis will be placed on coverage of measles (new programme element) and tetanus toxoid (pregnant women as the priority group).
- UNICEF will cooperate with Government approach first to expand steadily to reach all parts of the country by 1990 and secondly accelerated and intensive programmes in selected districts.

While certain UNICEF inputs like the strengthening of the cold chain equipment, vaccine production capacity, training of personnel and supply of vaccines required over and above indigenous production, will assist the overall pace of EPI, additional inputs will be available for the accelerated district specific programmes.

5.3. TRAINING AND EDUCATION

For the training of middle level managers, the World Health Organization (WHO) has produced a set of nine modules. This

training will be accelerated. Though sufficient training material are available for the training of medical staff, a gap exists in the availability of training material for paramedical workers who actually implement the programme in the field. UNICEF will support the development and production of training material as well as the training of para-medical workers. UNICEF will assist by providing the cost of training materials and courses in refrigerator repair, logistics and cold chain management.

Information, education and communication are essential for creating the demand for EPI. Appropriate communication techniques and strategies will be supported, starting with the following steps:

- identify and analyse specific educational messages for immunization.
- identify the target audience for each of these educational efforts.
- investigate areas of resistance to desired attitudinal and behaviour changes.
- design messages to overcome resistance.
- identify the availability of access to various types of media in the targetted area,
- select appropriate media for delivering the messages
- produce communication materials, pre-test, revise and re-test the messages and techniques of presentation
- distribute the material using appropriate distribution chanels in both the public and private sectors.
- monitor and evaluate the impact of the medium and the message and revise the methods used to increase impact.

5.4. COLD CHAIN

The detailed requirements of vaccine storage and distribution at various points from the factory end to the sub-centre have been worked out to match the immunization targets set under the regular and the accelered programmes. The following category of support staff will be necessary to manage the logistics, supply and cold chain for vaccines, number varying at different levels:

Cold chain/vaccine officer.
Logistics and supply personnel.
Repair technician.
Packer.
Driver.
Store Clerk.
Cold room attendant.

Storage and distribution facilities have to be strengthened at all points.

Location	*No. of Unit*	*Main equipment*
a) Factory	15	Cold room +4°C and −20°C
b) National storage	5	Refrigerated truck
c) State/Regional store	90	Walk-in-cooler, delivery van
d) District	425	Bank of refrigerator
e) Sub-district	400	Ice lining freezer
f) Primary Health Centre	5600	Refrigerator/Ice lining
g) Subsidiary Health Centre	5000	Refrigerator

Various cold chain equipment surveys have reported that at any given time 38 to 65% refrigerators are out of order. Special emphasis will be given on repair and preventive maintenance of the cold chain equipment from national upto the health centre level. This problem will be tackled by:

— mobile and static maintenance unit
— recruitment of refrigerator repair technician
— privision of tools and equipments
— provision of spares

The ultimate maintenance of the cold chain equipment can be taken up by the Health Equipment Repair Units in those states where this facility has been fully established. Crash repair of non-functioning equipment will be taken up on a priority basis.

India has the technological and industrial potential to produce and develop various conventional and innovative cold chain products indigenously. To improve the vaccine delivery system, the following activities will be taken up on R and D basis.

— Improving packaging of vaccine at factory,

— Improving containers for air transport,

— Designing vaccine carrier/thermos with longer cold life.

— Improving temperature - recording and monitoring devices.

5.5. VACCINE REQUIREMENT

India is self sufficient in the production of DPT, DT, TT, BCG and typhyoid vaccines to meet the requirements of the programme. Though the total requirement of DPT vaccine is much more than the production capacity of public sector, the reason for the low off-take from the private sector is primary due to time-consuming procurement procedures. Measles vaccine is yet to be produced in the country. Polio vaccine is reconstituted only in one source. While the local vaccine production capacity is stepped up towards selfsufficiency by 1990, UNICEF will close the gap between vaccine production and vaccine need by importation. UNICEF will commit to provide measles vaccines for the entire plan period to meet the country's requirement.

Support will be needed to boost the country's production to attain self-sufficiency. UNICEF will continue to support DPT vaccine production in the three public sector vaccine production centre by supplying chemicals and equipments. It is expected that 20.5 million doses of DPT vaccine produced during 1984-85, in these three centres, will increase production to 45.0 million doses by 1989-90.

Source	*Capacity of production of DPT vaccine in million doses.*	
	1984-85	1989-90
C.R.I. Kasauli	11.0	20.0
P.I. Coonoor	6.0	15.0
HBPC, Bombay	3.5	10.0
Total	20.5	45.0

5.6. COLLABORATIVE ACTIVITIES

UNICEF will encourage and support the involvement of organized groups and interests in the effort to reach ambitious and achievable targets set for EPI by 1990. In particular the active participation will be sought of:

- public sector enterprises,
- private, industrial and commercial companies,
- large undertakings directly run by government, like, railways, post and telegraphs, defence,
- nursing colleges, medical colleges,
- medical practitioners.

UNICEF proposes to meet the cost of supplying and installing the computer and data processing units at various levels for monitoring the programme and provision of vehicles for supervision at the district/city level. Other UNICEF commitments to specific plans of action may be any of the following, as occasions demand:

a) Direct inputs

- syringes and needles,
- antoclaves and sterilizers
- cold chain equipment, refrigerator, voltage stabilizer, vaccine carrier
- paper and printing, survey and record forms, ledgers and cards,
- 2-wheeled vehicles for supervision.

b) Capacity Building.

- training for all cadres,
- manuals, training materials and aids,
- support for Health Education Bureau, Radio, Television for production of materials.

c) Planning, Monitoring and Evaluation.

- Survey, baseline data collection, inventory etc.
- record keeping and data processing,
- research of problems, constraints, cultural/social/economic factors,
- analysis of reduction in disease prevalence.

6. INSTITUTIONAL SUPPORT FOR EPI

R.N. BASU

6.1. INTRODUCTION

National health programmes which are operated from Directorate General of Health Services (DGHS)/Ministry of Health and Family Welfare have been linked with an institution for their effective implementation. Some examples can be mentioned, like National Institute of Health and Family Welfare, Delhi for family welfare programmes; National Tuberculosis Institute, Bangalore for TB Control programme; Central Leprosy Training and Research Centre, Chingleput for National Leprosy Eradication Programme and Rajendra Prasad Centre of Opthol-mology, Delhi for the National Programme for Prevention of Blindness. Expanded Programme on Immunization (EPI) which has developed to a major programme from its inception in 1978 to date has planned to vaccinate all the new-borns year after year with six antigens. This requires support from many agencies including a national institute. At present, the programme is receiving necessary assistance and guidance from the vaccine manufacturing institutes like Central Research Institute (CRI) Kasauli; Pasteur Institute (PI) Coonoor and public health institute like National Institute of Communicable Diseases (NICD).

The objectives of NICD broadly cover three types of activities, viz. services, training and research in the field of communicable diseases and their control in the country. The thrust is on providing support to the ongoing disease control programmes. Some of the activities which are carried out by NICD in the recent years to accelerate the immunization programme in the country are discussed in this paper. This will give an idea, how the medical colleges can take up similar type of activities for assisting the state health authorities in improving the immunization performance.

6.2. TRAINING

In December, 1978, World Health Organization (WHO), in collaboration with DGHS organized two weeks' course at NICD for the State EPI Officers, on Planning and Management of EPI. The first national course on EPI was held at NICD in July, 1980. Last year, NICD gave priority to the training of trainers of EPI and organized two courses–one for the principals of the health and family welfare training centres from September 17-26, 1984 and another for the teachers of preventive and social medicine of medical colleges from 9-16 January, 1985. It is proposed to cover 50 medical colleges in this year, so that the scheme 'Universal Immunization Coverage' can be introduced in the 50 medical colleges in the first phase.

EPI modules have been integrated in the curriculum of three months' national course on epidemiology at NICD since 1981. Number of officers trained in these courses are as follows:

1981	26
1982	12
1983	16
1984	12

On the request of state health authorities the officers of NICD are deputed to act as course facilitators to assist in conducting training programme for medical officers. They have participated in the courses organized by National Institute of Health and Family Welfare, New Delhi and Health Directorates of J & K, Himachal Pradesh, Uttar Pradesh and Delhi Administration.

6.3. DISEASE SURVEILLANCE

NICD has taken active interest in surveillance of EPI target diseases along with other epidemic-prone diseases. This is being carried out through (a) coordination of sentinel centres; (b) survey and (c) outbreak investigations. A national workshop on sentinel surveillance was organized in January, 1985 with the objectives to (i) promote the concept of sentinel surveillance; (ii) review the retrospective data of last 5 to 10 years for selected diseases like diphtheria, poliomyelitis, tetanus and measles; (iii) finalize the form for sending the monthly report; (iv) ensure continuous support of the participating institutions in the sentinel information system. The sentinel centres which par-

ticipated in this workshop are—

1. Kalawati Saran Children Hospital, Delhi.
2. Infectious Diseases Hospital, Delhi.
3. Kasturba Infectious Diseases Hospital, Bombay.
4. Fever Hospital, Hyderabad.
5. Institute of Child Health, Madras.
6. Epidemic Disease Hospital, Bangalore.
7. Infectious Diseases Hospital, Calcutta.
8. Hospital for Crippled Children, Calcutta.

National and State EPI Programme Officers also participated in this workshop which will help in follow-up of the sentinel centres and extend sentinel information system to other towns. The retrospective data which has been collected in this workshop will be the beginning of prospective monitoring from the sentinel sites.

NICD has included poliomyelitis and measles in the integrated morbidity and mortality survey, which have been conducted recently. In this survey, the residual polio paralysis was estimated by surveying children of 5-9 years for detecting the defect, weakness or lameness of the lower limb. The lame child thus found was then investigated by a Medical Officer for ascertaining the cause of the defect in the lower limb. The summary of the survey is given below—

Area	*No. of children 5-9 years studied.*	*No. of lame children detected.*	*No. of polio paralysis*	*Prevalence rate per 1000 children, 5-9 years* (Without correction factor)
Alwar (Rajasthan)	10,505	186	139	13.2
West Godavari (A.P.)	23,404	202	122	5.2
Gurgaon (Haryana)	31,719	422	274	8.6
Nilgiris (Tamilnadu)	14,725	97	86	5.8

By use of several correction factors, it is possible to estimate the annual incidence rate of poliomyelitis per 1000 0-4 years children.

In case of reports of large size outbreak due to measles and with high case fatality rate, the services of NICD is requested to investigate and assist in control measures by state health

authorities. In 1984, measles outbreak in Bhilwara district of Rajasthan was investigated by NICD which provided important epidemiological data.

6.4. MONITORING VACCINATION PERFORMANCE

Vaccination coverage survey is an important tool to ascertain if the children of the right age group are being vaccinated with completed dosage schedule. NICD has included this survey technique not only for the course on planning and management of EPI but also integrated with all the courses of epidemiology. During the last 12 months, five such surveys have been conducted—two each in Alwar and Delhi and one in Himachal Pradesh. In addition to assessment of vaccination coverage, the reasons for not getting the child immunized or not completing immunization schedule were ascertained. These findings were communicated to the local health authorities for improvement in the vaccination performance. The findings of recent survey in Alwar and Himachal Pradesh are given below—

Vaccine	*Percentage of coverage*	
	Alwar (19.3.85)	*Gumarwin in Bilaspur district, Himachal Pradesh (3.9.84)*
BCG	26.2	65.4
DPT 1	48.1	87.7
DPT 2	36.7	77.3
DPT 3	31.8	64.9
Polio 1	40.9	78.2
Polio 2	36.2	71.6
Polio 3	30.3	63.0
TT for pregnant women	66.8	60.7
Fully immunized	16.2	49.7
Vaccination card available	22.3	Nil

In the absence of immunization card, mother's statement was considered for recording. For correct assessment, some documentary evidence is necessary. In case of BCG vaccination, scar was looked for.

6.5. QUALITY CONTROL OF VACCINE

BCG vaccine is produced at BCG Vaccine Laboratory, Madras. It is imperative for all the vaccine produced to undergo standar-

dization testing not only at the production centre, but also at another independent testing laboratory. To meet these requirements, BCG vaccine testing and quality control laboratory was set up at NICD in 1972. During the period 1979 to 1983, samples from 1000 batches (276 in 1979, 234 in 1980, 166 in 1981, 162 in 1982 and 172 in 1983) were received and tested. The test undertaken were (i) identity test; (ii) freedom from contaminating micro-organism; (iii) total culturable particles found and its stability and (iv) freedom from virulent myco-bacteria.

The work of potency testing of polio and measles vaccine has been taken up with the main objective to monitor the conditions of storage and transportation of vaccines from the manufacturers to the periphery. Oral polio vaccine is most thermolabile vaccine used in EPI. The vaccine vials (used or unused) are collected from the various levels of operation. More than 100 samples of oral polio vaccine have been collected from 17 states and tested during the last 10 months. The microtitration technique in Hep II Cincinnati cell lines is used for the test. The findings have been helpful to identify the areas where the cold chain is weak and reasons for these problems. This potency testing is expected to be of great value in improving the cold chain of vaccine. Limited number of samples of measles vaccine have also been collected for potency testing and this service will be made available when measles vaccine is introduced in the national programme.

6.6. HEALTH SERVICES RESEARCH

The main objective of studies at NICD is to define the epidemiological concepts viz. prevalence, endemicity level, spread and prevention of the vaccine preventable diseases; develop newer tools/techniques/methodologies for epidemiological assessment of infection in the community and undertake laboratory and field evaluation of new vaccines used in the programme. The studies at NICD covered various aspects of poliomyelitis, diphtheria, DPT vaccination, measles vaccination and tetanus. Summary of the results of the study which has got bearing on implementation of EPI have been published in "Feedback on EPI". The reduction in the incidence of Diphtheria, endemicity of neo-natal tetanus in Delhi, various facets of

use of oral polio vaccine, serological studies to monitor the immunization programme suggest the need for institutional support in effective implementation of EPI. Operational research and evaluation studies can be taken up on the request of the programme officers by medical colleges.

6.7. FEEDBACK

There must be regular communication back from higher levels of programme managements to lower levels. This can be done best through publication of newsletter. Feedback is important to keep the officers informed on various aspects of the programme and progress in different areas. All should be encouraged to contribute in this newsletter. The Communicable Diseases Bulletin (CDB) which is published quarterly from NICD has included materials on EPI in every issue and have drawn attention of the readers. The main theme covered in each issue are given below—

1. Volume 1, No. 1, April, 1984 — Poliomyelitis prevalence survey.
2. Vol. 1, No. 2, July, 1984 — Measles outbreak.
3. Vol. 1, No. 3, October, 1984 — Sentinel centres.
4. Vol. 1, No., 4, January, 1985 — Vaccines for EPI.
5. Vol. 2, No. 1, April, 1985 — Monitoring of EPI.

6.8. OTHER ACTIVITIES

The cold rooms of NICD are used for bulk storage of imported EPI vaccines. In this year, polio, measles, DPT and BCG vaccines which were imported had been stored at NICD. These were subsequently supplied to the neighbouring states. It is observed that after BCG vaccine Laboratory started functioning at Madras, this is first time when BCG vaccine has been obtained from Japan. Though the country is self-sufficient in the production of DPT vaccine, due to procurement problems, the vaccine had to be imported. The vaccines were procured from abroad through UNICEF.

Manual on laboratory procedure and epidemiological surveillance procedure in respect of measles and poliomyelitis has been published, for use by state and district epidemiologists and laboratory personnel. Bibliography of measles and

poliomyelitis have included studies in India and abroad for encouraging research in these diseases. All these publications are supplied on request.

Annex 6.1.

SELECTED REFERENCES

(List of publications by NICD officers on EPI during 1984)

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2. Ray Krishna; Surveillance of Diphtheria in and around Delhi; *Feedback on EPI*, NICD, Delhi, November, 1984, p. 19-23.
3. Ray Krishna and Grover S.S.; Sero-conversion after DPT Immunization; *Feedback on EPI*, NICD, Delhi, November, 1984, p. 24-29
4. Ray Krishna, Sehgal H., Grover, S.S.; Sero-conversion After Measles vaccination in Infants and Children; *Feedback on EPI*, NICD, Delhi, November, 1984, p. 30-31.
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11. Basu R.N.; Measles vaccine—feasibility, efficacy and complication rates in a multicentric study—*Indian J. Pediat.* 51: 139-143, (1984).
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15. Basu R.N.; Status of DPT vaccination Programme; *Indian Pediatrics*, 21 (6): 435-438, (1984).
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7. WORKSHOP ON E. P. I.

S.N. Ray and Subhash Chakraborty***

7.1. INTRODUCTION

Training programmes for the managerial level officials in the Expanded Programme on Immunization (EPI) have been organised and conducted by the Directorate General of Health Services regularly since 1980 when the first national course was held at National Institue of Communicable Diseases (NICD) Delhi, to be followed by similar courses at All India Institute of Hygiene and Public Health (AIIHPH) Calcutta and National Institute of Health & Family Welfare (NIHFW) Delhi in the same and succeeding years. The main objective of the courses was to provide necessary skills to the participants for organizing training programmes at state/divisional level for district level officers. The report on national course held at NICD Delhi during September 17-26, 1984 has been published by NICD as *FEEDBACK ON EPI.*

Keeping the varied need of the programme in view and in accordance with the request from the programme directorate, another national course on Planning and Management of EPI was arranged and conducted at NICD Delhi during January 7-16, 1985.

7.2. OBJECTIVE

The course had been specifically arranged to meet some of the needs of institutional support to the programme. It has been visualised that medical colleges, nursing institutions and other research and training bodies can and should extend their vital support to various aspects of the programme, specially the training, field operation, evaluation and health services researeh. A step forward to this end is the selection of the field practice areas and urban areas surrounding the medical

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colleges as the areas where universal immunization coverage will be attempted. It has been envisaged that once trained, the participants would, on their turn, take up the responsibility of training others in their respective institutions/areas of working.

7.3. THE PARTICIPANTS

Altogether 21 health professionals particpated in the course as trainees. Save two, all were from various teaching institutions including medical colleges, nursing institute and All India Institute of Hygiene and Public Health of Calcutta. Of the other two, one was a State EPI Officer and the other one was the Nursing Adviser to the Government of India. The selection of the participants show that the onus this time was on the teaching institutions.

The scheme of universal immuniztion service proposes to involve institutions like medical college, nursing school, public health institutes in accelorating the immunization programme. The name of the participants and respective institutes, the Course Facilitators and the Course Director have been show in Annex 7.1

7.4. THE INAUGURAL SESSION

Dr. R.N. Basu, Director of NICD, in his welcome address traced the genesis of the training courses for EPI in India and explained the need for continuing training in the planning and management for the managerial level officials. He specially emphasised the need for institutional support to the programme in which the teachers in various institutions can play vital roles. He also elaborated on how the programme is visualised to gradually expand form the selected areas of universal coverage to cover the whole country within target date of 1990.

The Chief Guest, Dr. G.P. Talwar, Director of National Institute of Immunology, Delhi, in his detailed elucidation of the immunological aspects of the EPI diseases, voiced caution over still unknown facets of immune responses and urged upon the learned gathering to continually probe the unknown to improve upon the present day achievements. He indicated the new technology in vaccine production which had recently been developed, and which would make vaccines more stable, effective and cheaper.

Dr. R. Kim-Farley, Medical Officer, EPI, WHO (SEARO)

apprised the audience about the evolution of EPI since May 1974 when the World Health Assembly, in recognition of importance of immunization as the most powerful and cost-effective weapon in disease control, set up the global EPI. He also dwelt on the keenness, commitment and progress made in the SEAR countries and especially in India towards achieving immunization coverage of the target population. He elaborated the need and importance of training the managerial cadre in EPI with the purpose of helping the administrators in taking many decisions essential to the effective management of the programme within the primary health care context.

The course was inaugurated by Dr. Kim Farley.

7.5. THE TRAINING PROGRAMME

The programme used the modules prepared by WHO. The participants were divided into 3 groups, with two Course Facilitators in each for working the following modules :

Conduct Disease Surveillance.
Allocate Resources
Manage Cold Chain System
Conduct Vaccination Sessions
Evaluation Vaccination Coverage
Supervise Performance
Provide Training
Ensure Public Participation
Treatment of Diarrhoea

All the cold chain equipments were demonstrated and a film on cold chain was exhibited. Mr. Srivastav, Cold Chain Officer from WHO/SEARO participated in the discussions on cold chain. Mr. R. Carrier of UNICEF conducted a discussion on need for mass education to create demand for vaccination. His talk was supplemented by slide projection. The field exercise on vaccination coverage assessment was carried out in three urban I.C.D S. blocks of Delhi. The report of the survey has been presented separately.

7.6. POTENCY TESTING OF POLIO VACCINE

The participants, on the request of NICD, brought samples of oral polio vacine from the field. During their stay, the samples were tested for potency and the results were communicated to them. The objective was to monitor the cold chain of vaccines.

Microtitration technique using Hep II Cincinnati cell lines was used. OPV samples were brought by ten out of 23 participants. A total of twelve samples were received, of which one was a half-used vial and eleven were unused vials. The States and the level of collection of the samples were as follows:

Sate	Number of samples collected	Level of collection			
		State H.Q.	District H.Q.	PHC	Imunization Centre
Andhra Pradesh	2	0	0	0	2
Delhi	3	0	0	0	3
Madhya Pradesh	2	1	0	0	1
Rajasthan	1	0	0	0	1
Uttar Pradesh	4	1	0	1	2
TOTAL	12	2	0	1	9

All the samples were found to be having satisfactory titre which lied between $10^{5.90\text{-}6.20}$ TCID $_{50}$/human dose, the normal being $10^{6.13\pm0.3}$ TCID $_{50}$/human dose.

7.7 CONCLUDING SESSION

The participants were addressed by Dr. D.B. Bisht, the Director General of Health Services, on the last day of the course. Dr. Bisht in his address stressed upon the importance of immunizing the new borns within the first year of their birth as they are most suceptible to diseases. While immunization should not be denied to anybody who wants it the data of vaccination of children above 1 year of age should not be included in the number of beneficiaries or achievement of target. A teacher himself, he called upon the participants, who were mostly teachers, to come to the forefront in meeting the national challange of achieveng universal immunization coverage in their own areas. Their success stories would stimulate activites and generate enthusiasm in other areas.

Shri R.P. Kapoor, Additional Secretary and Commissioner Family Welfare gave the valedictory address and distributed certificate to the participants. His address has been included in

the paper in Universal Immunization Coverage presented in this book.

ANNEX-7.1

NATIONAL COURSE ON THE PLANNING AND MANAGEMENT OF E.P.I., JANUARY 7-16, 1985.

PARTICIPANTS

1. Dr. J.S. Anand
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   Pardiatrics and Dean
   M.P. Shah Medical College,
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2. Dr. A.R.N. Setalvad
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3. Dr. D.N. Shah
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4. Dr. (Col.) B.K. Chakladar
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5. Dr. A.K. Govila
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6. Dr. I.C. Tiwari
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7. Dr. V.N. Mishra
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   Meerut (U.P.).

8. Dr. B.C. Srivastava
   Professor & Head,
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9. Dr. S.N. Sinha
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   Aligarh (U.P.).

10. Dr. G.M. Mathur
    Professor & Head of the Deptt.
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    J.L.N. Medical College,
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11. Dr. R. Garai
    Field Epidemilogist,
    A.I.I.H. & P.H.,
    Calcutta, West Bengal.

12. Dr. R.B. Bansal
    Professor & Head of the Deptt.
    of Preventive & Social
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    Jawaharlal Institute of
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    Educational & Research,
    Pondicherry.

13. Dr. R.K. Puri
Assistant professor & Head of the Deptt. of Paediatrics, Jawaharlal Institute of Postgraduate Medical Education & Research, Pondicherry.

14. Mrs. R.K. Sood
Nursing Adviser, Dte. General of Health Services, Nirman Bhavan, New Delhi.

15. Mrs. B. Bhattacharya
Principal, Rajkumari Amrit Kaur College of Nursing, Delhi.

16. Dr. P.V. Gulati
Vice Principal and Prof. of PSM, Lady Harding Medical College, Delhi.

17. Dr. A.K. Ahluwalia
Professor & Head of PSM Deptt., Indira Gandhi Medical College, Simla-1 (Himachal Pradesh)

18. Dr. (Mrs.) Rama Ram
Prof. & Head of Deptt. of PSM, North Bengal Medical College, Sushrute Nagar, P.O. NBO, Darjeeling, West Bengal.

19. Dr. (Smt.) Madhuri Basu
Associate Professor & Head, Deptt. of Preventive & Social Medicine, R.G. Kar Medical College, 1, Belgachia Road, Calcutta-4 West Bengal.

20. Dr. Gyanendra Singh
Prof. & Head of the Deptt. of Social & Preventive Medicine, G.S.V.M. Medical College, Kanpur-208 002 (U.P.).

21. Dr. R.S. Sharma
Asstt. Director, Field practice Unit, N.I.C.D., Alwar (Rajasthan).

COURSE FACILITATORS

1. Brig. S.L. Chadha, C-719, New Friends Colony, Delhi-110 065 (Ex-Mun. Health Officer, Municipal Corporation of Delhi)
2. Dr. Ranjit Sen, 211 - DDA Flats (SFS), Hauz Khas, Delhi-110 016 (Ex-Dy. Director General), Dte. General of Health Services, Ministry of Health, Delhi-11)
3. Dr. S.N. Ray, Deputy Director, Division of Epidemiology, NICD, Delhi-110 054
4. Dr. T.K. Ghosh, Asstt. Director (Epidemiology) (Now Dy. Director, Div. of Helminthology) NICD, Delhi-110 054
5. Dr. Subhash Chakraborty, Senior Medical Officer, Division of Epidemiology, NICD, Delhi-110 054
6. Dr. M.M. Bhattacharjee, Senior Medical Officer, Division of Epidemiology, NICD, Delhi-110 054

COURSE-DIRECTOR

Dr. R.N. Basu,
Director, NICD, Delhi-110 054

8. VACCINATION COVERAGE ASSESSMENT

S.L. Chadha and B.C. Srivastava***

A National Course on Planning and Management of EPI for teachers in the disciplines of Social and Preventive Medicine (SPM) and Paediatrics of medical colleges was held at NICD from Jannary 7-16, 1985, using the modules developed for the purpose. The use of the module on "Evaluate Vaccination Coverage" was followed by a field exercise in Delhi city.

8.1 AREA OF STUDY

Three resettlement colonies of Khichripur, Kalyanpuri and Trilokpuri were included in the study. All the three colonies are situated in trans-Jamuna area of Delhi and were selected for study because they are covered by Integrated Child Development Services (ICDS) scheme and constitute one block having a toal population of 1,10,000 spread over 115 "Anganwadis". Another reason of selection of this area was tht a UNICEF supported intensive immunization programme was carried out in this area recently. The health services of the area include a Maternity Home with 30 beds for MCH services run by Municipal Corporation of Delhi and a Ayurvedic Despensary in the same campus. Lady Harding Medical College also provides comprehensive health care to about 2000 population through its sub-centre. The area is well connected by roads to main city but the environmental conditions are very poor. Houses are small, ill ventilated and overcrowded. Water supply is by hand pumps and piped water system. The drains are used for defaecation by the children and the refuses are dumped on roadsides.

* Course Facilitator

** Professor of Preventive & Social Medicine, K.G. Medical College, Lucknow.

8.2 METHODOLOGY

8.2.1 Selection of Study Population

The list of Anganwadi's (115 in number) constituted the sampling frame; 30 Anganwadis were selected for study by cluster sampling technique, as described in the module on "Vaccination Coverage". Seven children in the age groups of 12-23 months were selected in each cluster by moving to left from each Anganwadi Centre. 1091 households were covered to enumerate 210 children; 4 children were excluded from study because they were found not between the age of 12-23 months. These clusters were revisited to get children of correct age group.

8.2.2 Procedure

The immunization coverage of the children selected for study was assessed by interview with the mother of the child or any other responsible person present in the household. A standard schedule, which was thoroughly explained to the participants of the course, was used for recording the information elicited from the family. Data and source of immunization was also recorded. A child was taken as immunized only when a documensary evidence was available, mostly the immunization cards at the Anganwadis centres, which provided the dates also. Age was determined by the birth certificates which were available in most of the families or enquiring about the data when the child's second birthday would fall.

8.2.3 Investigators

This study was an unique one in the sense that senior teachers of S.P.M. and Paediatrics conducted the survey themselves. Three course facilitatiors were all the time available for the help and guidance. Besides the participants, 10 NICD staff members also participated in the survey. Anganwadi workers (AWW) helped the investigators in building rapport with the families.

8.2.4. Date of Study – January 11, 1985

8.3 OBSERVATIONS

8.3.1 Immunization Coverage :

Out of 210 children included in the study the vaccination

coverage was as follows :

Vaccine	No. of children immunized	% of the total
B.C.G.	142	65.7
D.P.T. I	165	76.4
D.P.T. II	142	65.7
D.P.T. III	118	56.2
OPV I	164	78.1
OPV II	140	66.7
OPV III	127	60.5

137 children (96.47%) out of 142 vaccinated with BCG showed a scar of vaccination. 102 children (48.6%) were found to be fully immunized. 62 children (29.5%) had home based immunization cards. 58 mothers of the children studied (27.6%) had received tetanus toxoid when these children were in gestation.

8.3.2 Drop out rate

DPT Ist dose to 3rd dose	28.5%
OPV Ist dose to 3rd dose	22.6%

8.3.3 Reasons for incomplete immunization (Response from 92 mothers)

	No.	%
1. Not aware of correct schedule of immunization.	32	34.8
2. Child was not well	16	17.4
3. Work interferes	12	13.0
4. Immunization services were not available.	7	7.6
5. Time not convenient	6	6.5
6. Domestic problems	6	6.5
7. Plan of immunization not known	5	5.4
8. Fear of reaction	4	4.4
9. Wrong ideas of contraindication.	4	4.4
	92	100.0

8.3.4. Vaccine Delivery

Most of the immunizations (98%) were done by out reach activity by the Lady Health Visitor of Maternity Home at the

Anganwadi Centres. B.C.G. vaccine was given by a technician coming from District Tuberculosis Centre, Delhi. For giving DPT vaccine to the child a separate needle was used for each child. For BCG the same needle was used but flamed everytime. This information was gathered from Angawadi Worker.

8.3.5. Cold chain

The vaccine was brought to Anganwadi centre in thermos-flask with ice.

8.4. COMMENTS

Considering the heavy inputs provided by the UNICEF in the intensive immunization drive and availability of health services in the near vicinity of family the immunization coverage cannot be regarded as satisfactory. It was gratifying to note that there was no resistance in the community against immunization and coverage can be improved by ensuring the availability of services. There is no fixed programme of vaccination session at the Anganwadi centre. Even if there is a regular session at Maternity Home it is not utilised by the community.

A lesson that can be learnt from this exercise by the planners and managers of EPI is that clinic approach (fixed centre) is not going to help much in achieving targets. If in an urban situation like Delhi, with a MCH centre very close, the coverage could be achieved only by out-reach activity, what one could expect in a rural situation? The strategy of immunization has to be planned in a realistic manner to meet the needs of the community.

Immunization coverage can be improved by community education programmes. 34% of mothers of incompletely immunized children were not aware of correct immunization schedule. schedule. Out of various causes put forward by the mother, none are so formidable that they cannot be overcome. The area has great advantage of ICDS scheme and Anganwadi workers can be the key person to boost up the immunization programme. There is a potentiality of universal immunization coverage in this area.

8.5. RECOMMENDATIONS

8.5.1. A programme of immunization by out-reach activity at Anganwadi centre should be prepared and adhered to.

8.5.2. Mopping up operation to find out the unimmunized

children in the area and immunise them. A house to house visit has to be made by AWN/HV to prepare a list.

8.5.3. Concentrate on infants for immunization activity and complete the schedule in early childhood.

8.5.4. Carry out a regular programme of health education in the community regarding all aspects of immunization.

EDITORIAL COMMENTS :

I) It was found in this area that during the campaign, proportion of older children vaccinated was fairly high. This was because of intense publicity associated with campaign and desire of health workers to reflect the quantum of work. This indicates the need of vaccination coverage assessment of children 12-23 months age.

II) The effective coverage can be augmented substantially by cutting down the drop-out rate from first to third dose of DPT and polio vaccine. The children who have been contacted at least once, may be persuaded to return to cmplete the immunization schedule, especially in the area where this survey was done.

9. REQUIREMENT OF VACCINES

R.N. BASU

9.1. INTRODUCTION

Vaccines in adequate quantities and at right time in the immunization sessions are essential inputs for the success of the immunization programme. The number of beneficiaries to be covered at each level in each year have to be decided considering the infrasturcture for delivering immunization services and availability of vaccines. In this paper, the requirement of the vaccines for the whole country is discussed to decide procurement and production strategy. Some of the vaccines are produced in public sector institutes. The deficiency in their production to meet the need of the programme, can be covered up by procurement of vaccines from the private sector. The vaccines which are not produced in India, have to be imported either in bulk concentrate for reconstitution in the country or as finished product ready for distribution.

Government of India has made a conscious decision on universal immunization coverage by 1990. The resources in terms of manpower, material and money are being mobilised to achieve the target. As most of the vaccines are not available in the local chemist shop, and large quantities can only be obtained following advance notice of at least six months, an approximation of requirement of different vaccines in different years and likely source of availability have to be worked out. A review has been made here on the basis of certain assumptions for understanding the issues related to vaccines. This is an exercise performed at NICD, which may be followed by state EPI officers.

9.2. ESTIMATION OF BENEFICIARIES

In the universal immunization coverage, emphasis is on the primary vaccination of children and immunization of the pregnant women with Tetanus Toxoid (TT). By primary vaccination is meant that each surviving infant must get 1 dose of BCG, 3

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doses each of DPT and polio vaccine by first birth day. The interval between the doses should be at least one month. Measles vaccine will be a new element in the programme and recommended age is between 9 to 12 months of age of the child. One dose is adequate. The pregnant women should receive two doses of TT at an interval of one month during the pregnancy or one booster dose, if there is history of immunization during the earlier pregnancy. The last dose should be at least 15 days before the expected date of delivery.

The estimated annual births during 1985 is 24.2 million. Considering an average Infant mortality rate of 100 per 1000 live births, 10% of the new born will not be available for completing vaccination. Estimated number of eligible infants will thus be about 21.8 million children. Assuming 2.1% population growth rate, the eligible infants for vaccination during each year of seventh plan can be worked out. The number of pregnant women in each year will be more than the new born but for working purpose, estimated number of new born can be considered as the pregnant women available for vaccination. On the basis of "Health Statistics of India—1983" and "Sample Registration Bulletin-Dec. 1983", the data on beneficiaries have been worked out for next five years[1].

Table-9.1. *Year-wise Eligible children for vaccination*
(Figures in million)

	1985	*1986*	*1987*	*1988*	*1989*
1. Population Projection	725.0	740.8	756.9	773.3	790.2
2. Number of births	24.2	24.7	25.3	25.8	26.4
3. Number of Infants survived	21.5	21.9	22.4	22.9	23.4

(Source: Reference No:1)

9.3. VACCINES FOR INFANTS

Ministry of Health and Family Welfare proposes to cover 60% of the eligible infants during 1985-86, gradually increasing the coverage every year and reaching 85% during 1989-90. Vaccine requirement may be calculated on the basis of dosage requirement of each beneficiary and wastage factor of minimum 10% in case of DPT and polio vaccine and 20% in case of BCG and Measles vaccine.

Table-9.2. *Requirement of vaccines for Infants*
(figures in million)

	1985	*1986*	*1987*	*1988*	*1989*
1. Proportion of infants survived to be vaccinated.	60%	67%	75%	80%	85%
2. No. of infants to be vaccinated.	12.9	14.7	16.8	18.3	19.9
3. No. of doses of BCG vaccine required.	15.5	17.6	20.2	22.0	23.9
4. No. of doses of DPT vaccine required.	42.6	48.5	55.4	60.4	65.7
5. No. of doses of polio vaccine required	42.6	48.5	55.4	60.4	65.7

The above estimate has not considered the (i) booster dose of DPT and polio vaccine; (ii) no. of infants who will receive one or two doses of DPT and polio vaccine and not completing the immunization schedule.

The working group on Maternal and Child Health for formulation of Seventh Five Year Plan has suggested introduction of measles vaccine in national immunization programme from 1985-86. It has been proposed to cover 27% infants in the first year and 63% during the last year of plan period[2].

Table-9.3. *Requirement of measles vaccine*
(figures in million0

	1985	*1986*	*1987*	*1988*	*1989*
1. Percentage of Infants proposed to be covered.	27%	36%	44%	56%	63%
2. No. of children to be vaccinated.	5.8	7.9	9.9	12.8	14.7
3. No. of doses of Measles vaccine required.	7.0	9.5	11.9	15.4	17.6

9.4. REQUIREMENT OF TT VACCINE

TT vaccine is not only used for pregnant women but also for school children at the age of 10 years (leaving primary school) and 16 years (leaving high school) in the national immunization programme. TT for pregnant women is a priority programme. It is proposed to cover 50% of the pregnant women during 1985-86 and 100% by 1989-90. Wastage factor has not been considered, as some women require only one dose as booster.

Table-9.4 *Requirement of TT for pregnent women*
(figures in million)

	1985	*1986*	*1987*	*1988*	*1989*
1. Estimated No. of pregnent women.	24.2	24.7	25.3	25.8	26.4
2. Proportion to be covered.	50%	60%	65%	75%	100%
3. No. of pregnant women proposed to be immunized.	12.1	14.8	16.4	19.4	26.4
4. No. TT doses required.	24.2	29.6	32.8	38.8	52.8

The requirement of TT for school children can be worked out by estimating the surviving children at 10 and 16 years of age and drop out rate in the school. It may be assumed that many of the school children might have received DPT in infancy or DT during entry at school and one dose of TT will be adequate. The school enrollment level is taken as 69% at primary leaving and 25% high school leaving[3].

Table-9.5 *Requirement of TT for school children*
(figures in million)

	1985	*1986*	*1987*	*1988*	*1989*
1. Estimated No. of children at 9 yrs.	20.3	20.8	21.2	21.7	22.2
2. Estimated No. of children at 14 yrs.	20.3	20.7	21.2	21.6	22.1
3. Estimated No. of children attending school at 10 yrs.	14.0	14.4	14.6	15.0	15.3
4. Estimated No. of children attending school at 16 yrs.	5.1	5.2	5.3	5.4	5.5
5. Proposed proportion of coverage of 10 & 16 years children.	50%	60%	70%	80%	85%
6. No. of children at 10 years to be vaccinated.	7.0	8.6	10.2	12.0	13.0
7. No. of children at 16 years to be vaccinated.	2.6	3.1	3.7	4.3	4.7
8. No. of doses of TT required for 10 years children.	7.7	9.5	11.2	13.2	14.3
9. No. of doses of TT required for 16 years.	2.9	3.4	4.5	5.7	5.2

9.5. REQUIREMENT OF DT VACCINE

DT vaccine is recommended for children 5-6 years at school entry in the national immunization schedule. One booster dose is adequate if there is history of DPT or DT vaccine earlier. Children who have missed DPT during infancy are given two doses of DT as pre-school vaccination programme. The requirement of vaccine may be worked out by assuming one booster dose for each beneficiary, 10% wastage and 80% school enrollment.

Table-9.6 *Requirement of DT vaccine*

(figures in million)

	1985	*1986*	*1987*	*1988*	*1989*
1. Estimated No. of children at 4 years age.	20.4	20.9	21.3	21.8	22.3
2. No. of children attending school.	16.3	16.7	17.0	17.4	17.8
3. Proposed proportion of coverage.	75%	80%	85%	85%	85%
4. No. of children to be vaccinated.	12.2	13.4	14.5	14.8	15.1
5. No. of doses of DT vaccine required.	13.4	14.7	16.0	16.3	16.6

9.6. REQUIREMENT OF TYPHOID VACCINE

India is the only country, where typhoid vaccine has been included in EPI. Two doses are recommended for children at school entry, 10 years and 16 years. As the programme has picked up slowly during the sixth plan, it is assumed that 2 doses of vaccine will be required for each age group. The proportion of children to be covered is same as of DT at school entry and of TT fof 10 years and 16 years. Thus continuing with the data of number of children to be vaccinated from Table 9.5 Table 9.6 the requirement of typhoid vaccine can be worked out.

Table-9.7 *Requirement of typhoid vaccine*

(in million doses)

	1985	*1986*	*1987*	*1988*	*1989*
1. For school entry	26.8	29.5	31.9	32.6	33.2
2. For 10 years	15.4	18.9	22.4	26.4	28.6
3. For 16 years	5.7	6.8	8.1	9.5	10.3

9.7. REQUIREMENT OF EPI VACCINE

The above exercise indicates that the quantity of vaccines required to meet the planned targets are very large[4]. This is the minimum requirement excluding booster dose for DPT and polio vaccine and assumption of only booster dose for DT and TT for school children. The wastage factor is also kept minimum.

Table-9.8. *Minimum requirement of vaccines during seventh plan*
(in million doses)

Vaccine	*1985*	*1986*	*1987*	*1988*	*1989*
DPT	42.6	48.5	55.4	60.4	65.7
Polio	42.6	48.5	55.4	60.4	65.7
BCG	15.5	17.6	20.2	22.0	23.9
Measles	7.0	9.5	11.9	15.4	17.6
DT	13.4	14.7	16.0	16.3	16.6
Typhoid*	26.8	29.5	31.9	32.6	33.2
TT	34.8	42.3	48.1	57.7	72.3

* If restricted to children at school entry as practised now.

The following strategy need to be taken for maximum utulization of the available vaccines to support universal immunization coverage—

i) Priority for primary infant vaccination and TT for pregnant women be announced;
ii) Booster dose for polio and DPT need not be emphasised;
iii) One dose of DT and TT for school children, as booster may be used in the national programme;
iv) Typhoid vaccination may be limited to school entry.

9.8. AVAILABILITY OF VACCINE

The availability of vaccines to meet the needs of programme has been discussed separately[5]. The following points be brought forward in the context of current status of vaccine production.

i) About half of requirement of DPT vaccine has to be met from the production of private sector institutions in the country. The expansion of production of DPT in public sector has to be at faster rate.

ii) During the seventh plan, the programme has to depend solely on the diluting, blending and ampouling of bulk concentrate of polio vaccine by Haffine Biopharmaceutical Corporation (HBPC) Ltd., Bombay. Indigenous production of polio vaccine and second bottling plant will be continue to be discussed.

iii) The bottling facilities at BCG Vaccine Laboratory, Madras has to be augmented to supply the required quantity of vaccine in 20 doses ampoules. The use of smaller ampoules has reduced the production capacity.

iv) Production of measles vaccine during seventh plan in the country is unlikely. The working arrangement with an international organization for procurement of vaccine on a regular basis has to be formulated.

v) There are six state sector institutes, which are capable of producing DT and TT vaccines[6]. They should be assisted by supply of chemical and equipments not available in the country through UNICEF, and providing technical support. This will help Central Research Institute (CRI), Kasauli, Pasteur Institute (PI) Coonoor and HBPC Bombay to concentrate in the expanded production of DPT vaccine.

vi) Supply of typhoid vaccine by CRI Kasauli to all states may be considered for discontinuation. There are eight other public sector institutes in the country, which produce typhoid vaccine and can meet the requirements[5].

Note: The data for the calender year indicated in the tables is applicable for financial year, for example, the data for 1985 is applicable for 1985-86.

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10. MEASLES VACCINE—A CONTROLLED TRIAL IN PONDICHERRY

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10.1. INTRODUCTION

Measles is a major cause of morbidity leading to considerable mortality in Indian Children[1-4]. There is, however, no systematic collection of data on the epidemiology of measles in India. Experience with measles vaccination is also limited. Jawaharlal Institute of Post-graduate Medical Education and Research (JIPMER), Pondicherry, India was one of the several medical colleges requested by the Directorate General of Health Services, Govt. of India to carry out a two year measles vaccination-clinical and feasibility-study. The current paper outlines the results of a controlled trial conducted in a rural area to study the efficacy of measles vaccination.

10.2. MATERIAL AND METHODS

The study was conducted in the rural field practice area of JIPMER-The Jawaharlal Institute Rural Health Centre (JIRHC), Ramanathapuram-13 Kms from the Institute. It caters to 14,018 people spread over 12 villages covering an area of 25 sq. km. All villages are connected by all weather motorable roads. Cold chain facilities and transport were available at the Centre.

The measles vaccine was a lyophylised suspension of the highly attenuated Schwarz strain of live measles virus prepared by propagation in chick embryo-tissue cultures (SKF RIMEVAX). 1000 TCID 50 (0.5 ml) was given by subcutaneous injection.

390 children aged 9 months to 23 months were selected, by sequential selection till the desired number were enrolled.

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After obtaining the consent of parents 195 children, who were not acutely ill, and had no history of convulsions were given measles vaccination. They formed the study group. The remaining 195 acted as controls.

Both groups had 13 children in each month group; i.e. 13 children 9 months old, 13 ten months old etc. The study and control groups were similar in relation to age, socio-economic characteristics, and availability of health services. Earlier infection with measles was excluded by careful interview of the mothers and cross-verification with records. A history of measles was considered reliable as the disease and its symptoms are well known in the area. No serological diagnosis was attempted.

The children in the study group were enrolled and vaccinated from 24th April to 30th April 1980. One week after enrolment, the groups were visited to note the side effects of measles vaccination in the study group and occurrence of similar symptoms in the control group. Thereafter, both groups were followed up every month for 24 months and information collected on an attack of measles, its complication, occurrence of respiratory and diarrhoeal infections. Heights and weights were also recorded.

10.3. RESULTS AND DISCUSSION

There were 100 males and 95 females in the study group and 93 males and 102 females in the control. Of these, 175 in the study (90 M and 85 F) and 178 (87 M and 91 F) in the control could be followed up for the 24 months of the study; the rest dropped out at various intervals of time.

10.3.1. Incidence of measles and Vaccine protection

Table 10.1. shows the incidence of measles in the study and control groups from the time of enrolment to the time of completion of the study 24 months later. The attack rate in the study group was 4% and in the control 30.4%, the difference being highly significant ($P < 0.001$). There was no difference in the attack rates between males and females.

The vaccine gave an overall protection rate of 87% and the risk of getting measles was 7.5 times higher when unimmunised. In the first year, the protection rate was 79.7% and in

TABLE-10.1. *Yearwise incidence of measles in study & control groups*

	STUDY			CONTROL		
	No. of children	*No. of cases*	*Attack rate (% age)*	*No. of children*	*No. of cases*	*Attack rate (% age)*
1st year	175	3	1.7	178	15	8.4
2nd year	172	4	2.3	163	40	24.5
Overall	175	7	4	178	55	30.4

the second year it was 90.6%.

Other studies have shown a high protection rate offered by measles vaccine[2,5]. Upto 90% of vaccinated children were protected.[6,7]

10.3.2. Side effects of measles vccination

Of the 195 children who were immunized and visited a week after vaccination, one child (0.5%) developed a rash and 7 (4%) had fever within two days of vaccination; the temperature could not be ascertained. Associated diarrhoea or respiratory infection was found in one child each (0.3%). No child had convulsions. Overall complication rate was 4%. No similar symptoms were noticed in the control group at the same time.

This study has varied from other studies in that the reaction rate is very low (4%)[5-11]. The commonest reaction, in other studies, was fever occuring in 50 to 70 per cent of immunized children. Two to thirty five per cent had rash. One study showed an incidence of coryza in 34.5% of children[9]. The reactions occurred 6-12 days after vaccination. A possible cause for the low reaction rate could be i) due to single visit being made after 7 days and ii) that there was no specific question for recording fever in the follow-up sheet.

10.3.3. Nutritional status and measles infection

At enrolment the nutritional status of both groups were similar. 34% were nutritionally normal and the others were in various grades of malnutrition as classified by the IAP classification[12].

Of the children who developed measles, 37.7% were nut-

ritionally normal at the time of onset of illness. 49.3% were in Grade I, 11.3% in grade II and 5.7% in grade III malnutrition. It appears that in these children there was no prediction for malnourished children to develop measles.

10.3.4. Weight gain of measles cases

Children who were immunised and later developed measles gained about 1/2 Kg. more weight than the unimmunised children who developed measles. The difference was not significant because of the small number in the study group. Martchenko has reported that children immunized against measles lose less body weight than unimmunized children in case of a measles attack[13].

10.3.5. Protection against other infections

With a view to determine whether vaccinated children had lesser incidence of respiratory and diarrhoeal infections incidence of these were noted in the visit immediately following an attack of measles. Six of the 7 (86%) children and 31 of 55 children (56%) had respiratory infection in study and control groups respectively and only one child in control group (1.8%) had a diarrhoeal attack. In this study, therefore, measles vaccination offered no protection against other infections.

10.3.6. Mortality pattern

Only 2 children died during the period of study. Both were from the control group and death was unrelated to measles (gastroenteritis and drowning). In India case fatality rates have ranged from 3.6% to 14% .[1-4] Easy availability of medical services could have contributed to the nil mortality rate.

10.3.7. Severity of measles after vaccination

The severity of measles as assessed by duration of rash and fever was studied. There was no significant difference in duration of rash and fever among immunised children who developed measles and unimmunised children. Rash lasted for 5.9 days in the immunised children and 4 days in unimmunized. Fever lasted for 4.4 days and 4.5 days respectively.

10.4. CONCLUSIONS

This study has shown that:

i) Measles vaccine is a safe and efficacious vaccine with a

protection rate of 87%.

ii) Incidence of complications was low (4%).

iii) There was no difference in the incidence of respiratory and diarrhoeal infections between children who were immunized and those who were unimmunised, and who developed measles.

iv) Immunised children fared better, nutritionally, than unimmunised children, when they develop measles.

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Editorial Comments: This is one of the centre of the multicentric measles immunization project, in which 35 medical colleges participated. The study included the monthly follow up of our 10,000 children over a period of 2 years. Half of the children receieved a dose of measles vaccine at the begining of the study. Details can be seen in the Reference No. 14 and 15 indicated above.

11. E.P.I. AT THE HEALTH CENTRES ATTACHED TO J.I.P.M.E.R. PONDICHERRY

R.D. Bansal *

11.1. INTRODUCTION

The rural and urban health centres are functioning, as extension units of J.I.P.M.E.R., Pondicherry, from 1959 and 1961 respectively.

The Rural Health Centre (R.H.C.) at Ramanathapuram provides comprehensive family-centred health services to a population of 14,680 (1983) residing in 12 villages in the Union Territory of Pondicherry. There is a subsidiary Health Centre and a subcentre in the service area.

The Urban Health Centre (U.H.C.), similarly, caters to a population of 8,090 (1983) living in Kuruchikuppam, Vazhakul and a part of Vaithikuppam wards of Urban Pondicherry.

11.2. IMMUNISATION SERVICES

i) STAFF: The immunisation services are carried out according to the E.P.I. schedule, by the Public Health Nurse and the Auxilliary Nurse Midwife (Health Worker-Female) under the supervision of the Medical Officer. The Interns, posted for training at these centres, also actively participate.

ii) STORAGE AND TRANSPORT OF VACCINE: All the vaccines except measles vaccine are obtained from the office of the E.P.I. Pondicherry and stored in refrigerators at the Health Centres. Vaccine carriers are used for taking vaccines to the field. Measles vaccine is kept in deep freeze at the Department of Microbiology, JIPMER and supplied when required in vaccine carriers to the Health Centres.

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Thus, the cold chain is maintained effectively.

iii) METHOD: Particulars of new births in the area and children under five years of age migrating into the area are recorded in the under five register. From this, the Public Health Nurse finds out the children due for immunisation. The children receive immunisation when they attend the under five clinic conducted at the Centre and during home visits made by the Public Health Nurse and Auxilliary Nurse Midwife.

The antenatal women are registered during home visits or when they attend the centre. Tetanus toxoid is administered to them either in the antenatal clinic or at home. School children are immunised during school health visits.

iv) SYSTEM OF RECORD MAINTENANCE: Birth and death registers are maintained at the centres. The details of births are recorded by the P.H.N./A.N.M. by enquiry during home visits or of deliveries attended by her. The names of those who die are noted from the police station and also during field visits and enquiry carried out to ascertain the cause of death.

Antenatal and underfives cards and registers are also maintained in which the details of clinic and home visits due and made and the services provided are entered.

11.3. SURVEILLANCE

Family Folders are maintained at the Centres. One such folder is assigned for each family which, in addition to record of the family particulars, contains the Individual Health Cards (I.H.C.) of all the members of that family. Whenever a person attends the O.P.D. at the Health Centre, his I.H.C. is issued to him in which the details of diagnosis and treatment are entered by the attending doctor. The cards are later collected at the Pharmacy and the morbidity data analysed.

On-going surveillance is also carried out by periodical home visits.

11.4. COVERAGE WITH IMMUNIZATION

i) UNDER FIVE CHILDREN: The coverage of under fives with primary course of D.P.T. and Polio vaccines were 86.5%

and 87.6% respectively in the R.H.C. area (Table 11.1) and 90.6% and 90% respectively in the U.H.C. area (Table 11.2). Among the children 1 to 4 years of age, the coverage was found to be above 97% in both the areas.

B.C.G. vaccination had been administered to 79.9% of the under five children in the U.H.C. area. In the R.H.C. area, 57.6% of the eligible children born in 1983 had been similarly vaccinated.

Measles vaccination is being done as part of E.P.I. in U.H.C. area from April, 1980 onwards. At the end of 1983, 74.3% of the children above 9 months of age had been protected (Table 11.2).

A measles vaccination feasibility study was conducted in R.H.C. between May, 1980 and April, 1982. Of the 390 healthy children 9 to 23 months of age included in the study, half (195) were given the vaccine and the other half (195) were observed as controls. The follow up period was 24 months. The observations of the study have been presented else where in this book.

Regular measles vaccination has commenced in the R.H.C. area from 1982.

ii) ANTENATAL WOMEN: The yearwise coverage of the eligible antenatal women with tetanus toxoid for the triennium 1981 to 1983 (Table 11.3) is seen to be consistently above 80% for both R.H.C. and U.H.C. areas. However, it was observed that at the time of delivery more than 99% of the women in both the areas had been fully immunised.

Editorial Comments: Table 11.1 and 11.2 show that low percentage of children born in 1983 have been caused by 3 doses of D.P.T. and Polio vaccine, as compared to the children born in earlier years. This means that immunization is not completed by first birth day; children are immunized late.

TABLE-11.1. *Immunisation coverage of children in R.H.C. area as on 1st January, 1984.*

Year of birth	No. of eligible children	No. of children covered with Primary vaccination D.P.T.		O.P.V.	
		3 doses	1 or 2 doses	3 doses	1 or 2 doses
1979	349	346 (99.1)	0	342 (98.0)	0
1980	349	348 (99.7)	0	348 (99.7)	0
1981	348	340 (97.7)	0	342 (98.3)	0
1982	351	341 (97.2)	6 (1.7)	343 (97.7)	6 (1.7)
1983	269	66 (24.5)	186 (69.1)	84 (31.2)	175 (65.1)
ALL	1666	1441 (86.5)	192 (11.5)	1459 (87.6)	181 (10.9)

Figures in parenthesis indicate percentage covered in terms of the eligible children in that group

TABLE-11.2. *Coverage of antenatal women with tetanus toxoid immunisation*

Year	No. of eligible Antenatal women	% IMMUNISED	
		Fully	Partially
a) R.H.C.			
1983	483	82.6	13.3
1982	356	84.3	11.5
1981	446	88.3	10.3
b) U.H.C.			
1983	216	80.6	12.0
1982	224	81.3	11.2
1981	214	83.2	13.1

12. IMMUNIZATION COVERAGE IN RURAL AREAS OF PONDICHERRY

R.K. Puri and S. Srinivasan***

12.1. INTRODUCTION

The E.P.I. Programme in Pondicherry was started in 1979. The structures through which E.P.I. is being implemented are—Primary Health Centres, Sub-Centres and the Out-patient Clinics of hospitals. With the emergence of Integrated Child Development Services, Anganwadi Centres have also become important immunization centres. Immunization also has been carried out through mass campaign and camps.

The Department of Pediatrics, JIPMER.,involves itself in delivering the immunization services in the following manner :

— by conducting daily Under Five Clinic for healthy children in JIPMER:

— through the structures of ICDS services;

— by organising medical camps, etc.

12.2. MATERIAL & METHODS

12.2.1 Immunization coverage by 1 year of age

In order to study the immunization coverage in the rural areas of Pondicherry, the Department of Pediatrics carried out a survey of immunization coverage over a period of 12 months from 1st December, 1983 to 30th November, 1984 in a well defined population of three ICDS blocks having a population of 3 34,639.

i) All pregnant mothers and their babies born between 1st

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December, 1983 and 30th November, 1984 were followed up regularly for necessary immunization coverage.

ii) Of 6,849 new borns during this period, 5,401 were included for study. 1,493 children were excluded because they were either less than 3 months of age (as the immunization in this state is given after the completion of 3 months of age) or they had migrated from area where they were born.

This survey and the study were conducted by utilising—

a) Survey and health records maintained by Anganwadi Workers;

b) Monthly Monitoring Performance Records and Eligible Couple Register maintained by Auxillary Nurse Midwife (verified and discussed every month between various founctionaries);

c) Records of PHC; and,

d) By house to house survey by PGs of the Department in 40 village randomly selected for confirmation and check.

12.2.2.

In order to find out the overall immunization coverage under six years of age, a house to house survey was conducted in 10 randomly selected villages not covered by ICDS Scheme.

12.2.3. Reasons for Non-immunization

Parental attitudes, awareness and appreciation of immunization programme were studied from those parents who refused immunization to their children or those who defaulted after receiving the first dose. In order to achieve this, a proforma was circulated to 25 AWWs and 5 ANMs to elicit the responses of the parents towards refusal of immunization.

12.3. OBSERVATIONS AND COMMENTS

i) *B.C.G.*: It is observed from Table 12.1 that B.C.G. administration could be achieved in 57.8% of infants and 42.2% remained unimmunised even at the end of one year. It was also observed that the maximum number of infants received B.C.G. between the ages of 7 and 9 months.

ii) *D.P.T.*: Table 12.2 shows that complete DPT coverage (3 doses) was attained in only 70.9% infants; 86% received

first dose but 70.9% of these could complete DPT immunization by end of one year of age. Thus, 29.1% infants between the ages of 4 months and 12 months remained unimmunized at the end of one year.

iii) *Polio*: Table 12.3 reveals that the coverage against Polio was still less than DPT. Only 61.3% infants were fully immu-nised with 3 doses and 38.7% remained unimmunised at the end of one year of age.

iv) *Tetanus Toxoid* to pregnant women—61.6% received 2 doses of TT and 12.3% had received one dose of TT only (Table 12.4).

v) *Sex and Non-Receipt of Immunization*: Higher incidence of this default was observed in females (61.3%) as compared with males (38.7%).

vi) *Immunization upto 6 years in non-ICDS villages*: It can be seen from Table 12.5 that 50.1% children were immunised with BCG, 60.3% had received 3 doses of DPT and 49.4% received 3 doses against Poliomyelitis. Thus, the overall coverage in children under 6 years was still lower than in the well defined population of ICDS.

vii) *Booster Doses*: First and 2nd Booster Doses of DPT and Polio was given only to 34.5% and 25.4% children respectively.

viii) *Reasons for Non-Immunization*: The responses offered by 200 parents in descending order of frequency were:

— unaware about the utility of immunization;

— avoidance of immunization due to minor illness;

— child too young and delicate to tolerate immunization;

— fear of complications after observing the same in other children;

— indifference in behaviour towards immunization due to religious taboos;

— distance from the immunization centre;

— lack of faith in immunization and indifference in behaviour;

— some of the parents felt that the Government implemented family welfare programmes by giving these fatal injections to children and thus, reducing population.

All these factors suggested that the delivery of health education to these parents was not adequate and explicit by accounted for the increased failure rate.

On the Government side, the poor coverage of BCG and Polio was due to non-avilability of these vaccines in time and non-avilability of children at the time of visit by ANM for immunization and inadequate rapport of the immunizing personnel with the individual families.

TABLE 12.1. *B.C.G. Coverage in infants*

Age	*No. received*	*Percentage*
4-6 months	513	9.5
7-9 months	1434	26.5
10-12 months	1176	21.8
Total received	3123	57.8
Not Received	2278	42.2

TABLE 12.2. *D.P.T. Coverage*

Age	*1st Dose*	*2nd Dose*	*3rd Dose*
4-6 months	1413	1117	682
7-9 months	1977	1613	1957
10-12 months	1256	1276	1193
	4646	4006	3832
	86%	74.2%	70.9%

TABLE 12.3. *Polio Coverage*

Age	*1st Dose*	*2nd Dose*	*3rd Dose*
4-6 months	1013	819	579
7-9 months	2058	1958	2068
10-12 months	1027	928	650
	4098	3705	3297
	75.9%	68.5%	61%

TABLE 12.4. *Tetanus toxoid to antenatal mothers*

Pregnant women in 1st year	6894	
1st Dose	5097	73.9%
2nd Dose	4248	61.6%

TABLE 12.5. *Immunization coverage under six years*

Age Group	*No. of children*	*B.C.G.*	*D.P.T. (3 doses)*	*Polio (3 doses)*
Upto 6 months	77	33	16	9
6-12 years	59	39	18	8
1-2 years	129	67	83	58
2-3 years	167	103	106	93
3-6 years	397	203	277	242
	829	415	500	410
		50.1%	60.3%	49.4%

13. SENTINEL SURVEILLANCE IN INDIA

R.N. Basu *

13.1. INTRODUCTION

Central Bureau of Health Intelligence (CBHI) of the Directorate General of Health Services (DGHS) collects data on 20 communicable diseases, which include vaccine preventable diseases also. The disadvantage of this system is that, the criteria of diagnosis varies since a large number of different types of institutions, rural dispensary to a teaching hospital, are involved. The major problem is that all the centres do not send the reports and those who do, are not regular. Sample surveys conducted in India, confirm gross under-reporting of cases. The information asked is also kept to the bare minimum, namely cases and deaths. The routine reports do not provide any epidemiological data. Neonatal tetanus is, for example, not recorded separately but is clubbed together with other cases of tetanus. The concept of surveillance of diseases through selected institutions was initiated while developing Expanded Programme on Immunization (EPI) in the country.

13.2. EVOLUTION OF SENTINEL SURVEILLANCE

Four diseases, namely childhood tuberculosis, diphtheria, poliomyelitis and neo-natal tetanus were taken up for inclusion in the sentinel information system. In case of tuberculosis, the information asked for was type of tuberculosis (meningeal, bone, miliary) and presence of BCG scar. In case of diphtheria and poliomyelitis, age and history of past immunization was asked for. In case of neo-natal tetanus, place and agent for delivery of the child and TT immunization of mother were enquired. A simple one sheet proforma for all the four diseases was prepared.

* Paper presented at WHO South East Asia Regional National Programme Managers Consultative Meeting on EPI in 1985.

The teaching hospitals and other institutions where medical officers were working closely with EPI section of DGHS, namely those participating in measles immunization project, were requested to enroll as a sentinel centre for one or more of the above selected diseases. The initial enrolment was as follows—

Disease	*No. of sentinel centres*
Diphtheria	10
Poliomyelitis	11
Tetanus	7
Childhood tuberculosis	9

The initial difficulty faced by sentinel centres were the absence of record of past-history of immunization of the patients which was modified to include the data on immunization and the place of delivery of child in case of neo-natal tetanus. Only few institutions, acted as the sentinel centre for all the four diseases. It was felt that a separate form for each disease would be more useful. Feedback, in the form of analysis of data, was provided through quarterly EPI Bulletin. The rgularity and completion of report could not be maintained through correspondence.

13.3. WORKSHOP ON SENTINEL SURVEILLANCE

A national workshop on sentinel surveillance was organized at National Institute of Communicable Diseases (NICD) in the first week of January, 1985, with the objective to i) disseminate the concept of sentinel surveillance, ii) review the data of last 5-10 years for selected diseases like diphtheria, poliomyelitis, tetanus and measles, iii) finalise the form for sending monthly reports and iv) ensure continuous support of the participating institutions in the sentinel information system. The workshop was preceded by personal contact with selected sentinel hospitals and publication of available data from some institutions in communicable diseases bulletin.

The participants included representatives from World Health Organization (WHO), Programme Officers at national and state level, medical superintendents of selected hospitals, Indian Council of Medical Research (ICMR), CBHI and NICD. The Infectious Diseases Hospital (I.D.), Children Hospital, Hospital for Crippled Children located in six metropolitan cities,

namely, Calcutta, Bombay, Madras, Delhi, Hyderabad and Bangalore, which provided data to NICD were invited. This gave an opportunity for face to face discussion between those who provided, collected and used the hospital data for effective implementation of disease control programmes. The exchange of information on different procedure of admission, record maintenance and management of cases in the various hospitals was an important beneficial outcome of the workshop, in addition to understanding of the value of reporting of data. The presence of national and state programme officers in the workshop who are supposed to take action on reports enabled them for maintaining follow-up with the identified sentinel centres and extend the sentinel information system in other hospitals of the state. The areas for further study and methods for providing appropriate feedback were indentified by the representatives of ICMR, NICD and CBHI, who are generally involved in collection of data.

The programme followed can be classified into three broad groups, namely a) concept of sentinel surveillance and development of medical record in hospitals, b) retrospective data on admission of EPI target diseases in sentinel centres and c) development of sentinel surveillance in respect of other diseases like rabies, diarrhoeal diseases, viral hepatitis, meningitis etc. WHO Medical Officer described the sentinel surveillance as existing in the countries of south-east asian region, problems faced by them and suggested measures for making the system functional. Director, CBHI narrated the development of medical record section in the hospitals. Medical record officer of one of the sentinel centre, presented how hospital records are maintained and can be made easily available for action programme and research study.

Four themes on EPI target diseases, namely a) Poliomyelitis surveillance, b) Trend of Diphtheria incidence, c) Measles and its complication and d) Problem of Tetanus were taken up for discussion, on the basis of presentation of retrospective data of three sentinel hospitals on each of the above topics. The presentation of these papers stimulated discussion on magnitude of the problem, current intervention measures and use of hospital data for monitoring the community health programme.

13.4. RETROSPECTIVE DATA

The collection of retrospective data can be the beginning of prospective monitoring from sentinel sites. The request for sending data on in-patients for last 5-10 years stimulated hospital authorities to examine the current record-keeping, type of data easily available and its possible use in public health practice. The preparation of a statement of data for last few years assisted in making decision on the disease for which the institution can act as sentinel post. This also helped to understand the significance of a simple monthly report of some specific diseases to monitor the health programme. The necessary revision of case sheet was made after discussion to meet the requirement of sentinel surveillance. The retrospective review of records can be used as base line information, linking with important development in public health programme at a particular year.

The available retrospective data can demonstrate the beginning of impact of immunization programme by documenting a decline in the hospital admission rate due to certain disease. An example of this was provided from data for declining trend of diphtheria in the I.D. hospitals of Bombay, Madras, Delhi and Bangalore. Whether the decline is due to availability of simple effective drug for treatment outside the hospitals or due to

TABLE-13.1 *Declining trend of diphtheria in 3 I.D. hospitals*

Year	I.C.H. Madras		I.D.Hosp. Bangalore		I.D.Hosp. Bombay	
	No. of cases	% of total admission	No. of cases	% of total admission	No. of cases	% of total admission
1974	439	2.0	1122	19	739	3.1
1975	553	2.2	900	25	627	2.9
1976	541	2.0	1262	30	417	2.1
1977	425	1.5	1240	30	286	1.6
1978	95	0.4	1108	26	195	0.8
1979	51	0.2	829	16	111	0.5
1980	36	0.1	797	16	81	0.4
1981	24	0.07	656	12	90	0.4
1982	15	0.05	355	9	76	0.4
1983	9	0.03	293	7	53	0.3
1984	N.A.	N.A.	165	5	51	0.3

wide coverage of the children by immunization has to be ascertained. Correlation with vaccination coverage assessment in the community will be useful.

The retrospective data can help in formulation of strategies of the health care delivery system. Before implementing EPI, vaccination was carried among large age group, i.e. BCG upto age of 20 years, DPT 10 years and polio among school children. The data of sentinel centres strengthened the hands of national programme officer to recommend vaccination of children before 2 years of age. All the sentinel sites reported maximum number of polio cases (more than 78%) below the age of two years.

TABLE-13.2. *Age distribution of polio cases*

Age group	*% ge of total cases*					
	ICH Madras (1983)		*Kasturba Hospital (1984)*		*Kalavati Children Hospital Delhi*	*Saran (1983)*
	Number	*% ge*	*Number*	*% ge*	*Number*	*% ge*
0-1 Yr	423	36.7	307	49.0	749	55.0
1-2 Yr	487	41.9	235	37.6	445	32.7
2-3 Yr	148	12.7	60	9.6	127	9.3
3-4 Yr	65	5.6	15	2.4	31	2.3
4-5 Yr	17	1.5	6	0.9	6	0.4
5 and above	18	1.6	3	0.5	4	0.3
Total	1158	100.0	626	100.0	1362	100.0

13.5. USE OF DATA

High incidence of poliomyelitis is seen during July, August, September which corresponds to well demarcated monsoon season. About 45% of cases of the year are reported during three months of the year (July to September) and about 50% of the admitted cases gave history of injection during the week preceding illness. This suggests necessity for intensification of immunization programme (including DPT, OPV) during the low polio incidence period namely November to April.

TABLE-13.3. *Percentage of annual admitted polio cases from july to september*

Hospital	*Year*	*July*	*August*	*September*	*Total*
Polio Hospital, Calcutta	1984	11.7	18.5	16.1	46.3
Kasturba Hospital, Bombay	1980	20.6	15.6	10.2	46.4
	1981	15.4	19.8	12.6	47.8
	1982	16.0	14.8	9.7	40.5
	1983	15.5	16.5	13.4	45.4
Kalawati Saran Hosp., Delhi	1980	21.1	14.7	13.8	49.6
	1981	13.6	16.7	12.4	42.7
	1982	13.3	11.8	10.1	35.2
	1983	13.8	15.2	11.7	40.7

The data on admission due to a particular disease in a city hospital, should not be considered in absolute number. The rapid increase of population in metropolitan cities need calculation of incidence rate. Moreover, experience shows that, many of the cases come from neighbouring areas and take advantage of good medical care facilities in the city. This requires correction for residence factor. Conclusion should not be drawn from the trend of few years. The admission of poliomyelitis cases in Bombay and Delhi hospital provide the above lessions.

TABLE 13.4. *Incidence rate of poliomyelitis on the basis of admitted cases correcting for residence and increase in population.*

Year	*Kasturba Hospital Bombay*				*Kalawati Saran Hospital, Delhi*			
	Total cases	*Resident of Bombay*	*Incidence rate per 100,000*		*Total cases*	*Resident Delhi*	*Incidence rate per 100,000*	
			Total	*Resident*			*Total*	*Resident*
1974	501	471	7.6	7.2	553	268	13.2	6.4
1975	715	654	10.6	9.7	1288	576	29.5	13.2
1976	733	600	10.5	8.6	962	469	21.0	10.3
1977	757	651	10.5	9.0	1334	581	27.9	12.2
1978	731	637	9.8	8.6	1808	769	36.2	15.4
1979	987	840	12.8	10.9	1539	617	29.4	11.8
1980	994	830	12.5	10.5	1831	746	33.4	13.6
1981	855	725	10.5	8.8	1828	829	31.9	14.5
1982	860	710	10.1	8.3	1480	675	25.2	11.3
1983	714	596	8.1	6.7	1364	603	21.8	9.6
1984	639	515	6.9	5.6	996	425	15.2	6.5

13.6 CONCLUDING REMARKS

a) Sentinel centres provide wealth of epidemiological information to monitor a health programme which have specific goals for reducing morbidity and mortality.
b) To keep initial efforts within feasible limits, attempt should be made to select sentinel sites in the state capitals. Though it has urban bias, the institutions have adequate standards of diagnosis and acceptable record keeping.
c) Periodic visit to sentinel sites, providing feedback through news bulletin and annual review meeting are necessary to maintain interest for regular despatch of reports.
d) State programme officer should keep regular contact with sentinel sites and publicise the use of data in the disease control programme, like formulation of strategy or monitoring the trend of incidence.
e) Institutional link up, like Entero-virus Research Centre (ICMR) with I.D. Hospital in Bombay for poliomyelitis surveillance, Kalawati Saran Children's Hospital with NICD in Delhi for poliomyelitis, measles and tetanus surveillance and I.D. Hospital with NICD in Delhi for Diphtheria surveillance are found to be useful for additional laboratory support, detailed analysis of data and action on reports.

14. TASKS OF EPI

14.1. TASKS OF EPI — ONE

Integrate vaccination services

The vaccination services have to be integrated so that all the vaccines are available at each vaccination session to reduce the number of contacts to the minimum. Vaccination services should be available in all the hospitals, dispensaries, and maternity and child health (MCH) centres in the urban areas and in the primary health centres and sub-centres in the rual area.

Available Infrastructure

	Rural	*Urban*	*Total*
Hospitals	1894	5287	7181
Dispensaries	12943	8837	21780
Primary Health Centres	5959	-	5959
Sub-centres	65643	-	65643

(Source : Health Statistics of India 1984; Central Bureau of Health Intelligence, New Delhi-1.1).

Appropriate and combined strategies of implementation should be adopted depending on local conditions and feasibility.

i) Fix the day and time of vaccination sessions in the centres. It may be daily, bi-weekly or weekly. This should be prominently displayed at the fixed centres. In these centres either adequate cold storage facilities should be available or the vaccines can be carried to these centres on the day of the vaccination sessions.

ii) Organization of outreach operation to villages surrounding the health centre beyond walking distance will be necessary. In this programme, advanced information must be given to the concerned people. The session will be organized in some common place, like 'Anganwadi', community centre etc. Vaccines will be carried in thermocole boxes on the day of vaccination session.

iii) Intensification of the programme can be organized for a

period of three to four months by mobilizing all resources. Services have to be continued during subsequent years.

Visits are made to the schools by para-medical workers for immunization of the children. In the metropolitan cities many children are vaccinated by private medical practitioners. Although it is easier to achieve quick results through a vertical approach, such programmes are far more expensive and difficult to sustain over the years than those provided through the primary health care approach.

14.2 TASKS OF EPI— TWO

Supply vaccines

For implementing the immunization programme, the vaccine production in the country must meet the requirements. India is self-sufficient in the production of DPT, DT, TT, BCG and typhoid vaccines. Polio and measles vaccines are not manufactured in the country and are imported. Government of India assists the states by supplying vaccines. The vaccines are allocated to the states on the basis of annual operational target. Vaccines are supplied by designated manu facturer to the consignees on monthly or quarterly instalment.

Expected supply of vaccine during 1985-86 (in million doses)

Institute	*DPT*	*DT*	*TT*	*BCG*	*Polio*	*Typhoid*
Central Research Institute, Kasauli	13.0	16.0	22.0	–	–	24.0
Pasteur Institue, Coonoor	9.0	6.0	6.0	–	–	–
Haffkine Bio-pharmaceutical Corpn (HBPC), Bombay	6.0	4.0	8.0	–	50.0	–
Institute of Preventive Medicine, Hyderabad	–	–	2.0	–	–	–
B.C.G. Vaccine Laboratory Madras	–	–	–	20.0	–	–

Part supplies of DPT and TT vaccine will be procured from the private sector. Voluntary hospitals, municipal corporation, medical practitioner and other agencies, who like to purchase vaccines, may contact H.B.P.C., Parel Bombay, 400 012. The organization has got ten depots in the country.

State health authorities should indicate their requirements

to Assistant Director General of Health Services (EPI), Nirman Bhawan, New Delhi -11, along with addresses of the consignees to which the vaccine would be sent and proposed phasing of supply. In big states, the programme officer may like to get the vaccine directly in the Divisional offices. The manufacturers can send vaccines to any city of the country, where there is an airport. The vaccines are despatched by air unless road transport is quicker and more convenient. Prior intimation is given so that the vaccines can be cleared immediately on arrival at the airport.

States with more than one airport (Indian Airlines)

States	*Airports*
1. Andhra Pradesh	Hyderabad, Vizagapattam, Tirupati, Vijayawada
2. Assam	Gauhati, Dibrugarh, Tejpur, Jorhat, Silchar, Lilabari
3. Bihar	Patna, Ranchi
4. Gujarat	Ahmedabad, Bhuj, Baroda, Jamnagar, Rajkot, Bhavnagar
5. Jammu & Kashmir	Srinagar, Jammu, Leh.
6. Karnataka	Bangalore, Belgaum
7. Kerala	Trivandrum, Cochin
8. Madhya Pradesh	Bhopal, Gwalior, Indore, Jabbalpur, Raipur, Khajuraho
9. Maharashtra	Bombay, Pune, Nagpur, Aurangabad, Nasik
10. Rajasthan	Jaipur, Udaipur, Kota
11. Tamilnadu	Madras, Madurai, Coimbatore, Tiruchirapally
12. Uttar Pradesh	Lucknow, Gorakhpur, Agra, Kanpur, Varanasi, Allahabad
13. West Bengal	Calcutta, Bagdogra.

THREE

14.3 TASKS OF EPI—

Maintain Cold Chain

The vaccines which reach the child must be potent and effective. The cold chain is a system of transporting and storing vaccines at recommended temperatures from the manufac-

turer to the point of use. The cold chain comprises of cquipments, transport and manpower.

Once the potency of a vaccine has been lost, it cannot be regained by putting back in the refrigerator. The following points have to be remembered –

i) THE vaccines have to be stored and transported at temperatures between + 4° to + 8°C. Polio and measles vaccine can be kept at sub-zero temperature.
ii) DPT, DT, TT and typhoid vaccines should not be frozen.
iii) The vaccines should not be exposed to direct sunlight.
iv) One person should be made responsible for the indenting, receiving, storing and Jistributing vaccines.

At present, all vaccines are transported from the manufacturers to the State/Divisional stores by air. Polio and measles vaccines are sent in thermocole boxes packed with ice. Provision has been made for walk-in-cooler at the state/divisional levels for bulk storage of vaccines. Distribution vans have been provided for despatch of vaccines from state to district level. Refrigerators, vaccine carriers, ice-packs, dial thermometers have been provided at the district and primary health centre.

Dial thermometers are used to record the temperature in the refrigerators. The thermometer is kept in the top shelf of the refrigerator. One person should be made responsible to record the temperature twice a day. The temperature should be checked during supervisory visits. The main problem is to keep the refrigerators in working condition. Most of the refrigerators get out of order only because of poor maintenance.

The vaccines must not only be supplied regularly to a very large number of vaccination centres spread all over the state, covering large distances, but also services have to be provided in places without electricity or which have frequent power failures. In some primary health centres, vaccination programme is carried out three or four days in a month, correlating with receipt of vaccines. Large balance stocks should not be allowed to accumulate.

14.4 TASKS OF EPI— FOUR

Conduct Disease Surveillance

The ultimate objective of EPI is to reduce the incidence of diseases, for which vaccination services have been provided in the community. This requires not only base line information but also disease incidence data on regular basis for measuring the impact of immunization programme. Surveillance signifies a collection of data for some action. There are many ways of collecting the relevant information. Each of the methods has its advantages and limitations and can be used either separately or in conbination with each other.

Routine reporting of cases and deaths is the simplest and the most widely practised way of collecting information. District health officer should check the following activities to improve the reporting system.

a) *List of reporting unit* : A list of all centres expected to send monthly report on communicable diseases including EPI diseases should be prepared. The teaching hospitals, institu-tions run by vountary agencies, public sector organizations (e.g. ESI) and departments other than health (e.g. Railway) should also be included in the list.

b) *Control of reports* : A wall chart by month showing all reporting units provides a simple method of monitoring incoming reports. By entering the date of receipt from each unit under the appropriate month, it is possible to identify missing and late reports for follow up.

c) *Negative reporting* : If a report is not received from a particular centre, it si difficult to know whether there were no cases or the area had failed to report the cases. For this reason, it is important to send even 'Nil' reports.

d) *Delayed report* : The PHC or the district should send the compiled report to next higher level on the scheduled date, even if they have not received the report from all the units. Delayed reports recived after after despatch of the consolidated statement, can be included in the next month's report.

e) *Diagnosis of disease* : It is not necessary to make a diagnosis only after laboratory test. Standardized clinical case definition will improve the quality and uniformity of disease reporting.

There are other methods of surveillance, like survey, sentinel centre, active surveillance etc. Interested officers may write to Director, National Institute of Communicable Diseases, 22-Shamnath Marg, Delhi - 110 054 for more information.

14.5 TASKS OF EPI— FIVE

Follow Immunization Schedule

Each country frames its own immunization schedule keeping in view the epidemiological pattern of the diseases, the types of vaccine available and the administrative feasibility of providing the services. In 1978, when EPI was started in the country, smallpox vaccination was included in the national immunization schedule. After global eradication of smallpox, smallpox vaccination has been deleted. Pilot studies carried out in 36 medical colleges on use of measles vaccine has suggested for introduction of measles vaccine in phases from seventh plan period.

National Immunization Schedule

Beneficiaries	*Age*	*Vaccine*	*No. of doses*
Infants	3-9 moths	DPT	3
		Polio	3
		BCG	1
	9-12 months	Measles	1
	18-24 months	DPT	1 (booster)
		Polio	1 (booster)
Children	5-6 years	DT	1 (booster)
		Typhoid	2
	10 years	TT	1 (booster)
		Typhoid	1 (booster)
	16 years	TT	1 (booster)
		Typhoid	1 (booster)
Pregnant women	16-36 weeks	TT	2 (one if vaccinated during last pregnancy).

The EPI Global Advisory Group in its meeting in October, 1984 concluded that in all countries, routine immunization

with DPT and oral polto vaccine can be safely and effectively initiated at 6 weeks of age. Neonatal BCG vaccination is continuing in city hospitals. The following points may be noted –

i) DPT and polio vaccines are given to the child at the same time. BCG can be given with any of the three doses but the sites of the injections of the DPT and BCG vaccines should be different.
ii) Interval between doses should not be less than one month.
iii) There is no maximum interval between the doses. If for some reason, the child did not get the scheduled dose in time (within 4 to 8 weeks) he may be given the dose as soon as this is possible without starting the course again.
iv) Malnutrition, low-grade fever, mild respiratory infections, diarrhoea and other minor illness are not contraindications to vaccination.
v) In case a pregnant woman is registered late and two doses can not be administered, one dose shold not be denied.

14.6. TASKS OF EPI— SIX

Train Personnel

It is necessary to identify the training needs of different categories of personnel at various levels so that each one can function effectively to promote immunization programme.

State health authorities with the assistance of Regional Health & F.W. Training Centres/Medical colleges should organize 10 day's course on planning and management of EPI for district level medical officers. A set of seven modules developed by WHO is used in this course. The modules, fund and facilitator for organizing such course can be requested by state EPI officer to Assistant Director General of Health Services (EPI), Nirman Bhawan, New Delhi-110 011.

The State EPI Officer shuld also organize training courses for non-medical supervisors at the district level. Three to four days orientation will be adequate and emphasis on certain topic has

to be given depending on the category.

Public Health Course — Vaccination session, Cold chain, Community participation.

Extension Education — Community participation, Training, Cold chain.

Para-Medical Assistant — Disease surveillance, Vaccination coverage, Survey, Community participation.

The district health officer should arrange for orientation of medical officers of the primary health centres. The subjects like Disease Surveillance, Cold Chain, Vaccination Session and Community Participation are important for them. Modules can be made available on request. State EPI officers can consider modification of the existing modules to suit required situation and translation into local language.

In the primary health centre (PHC), on the spot training may be organized by demonstrating the use of cold chain equipment or method of reporting cases, which are preventable by immunization. To integrate BCG vaccination in the primary health centres and sub-centres, it is necessary to give practical training to the male and female health workers. This can be achieved by using the services of a BCG technician for a period of 15 days to the PHC where health workers act as apprentice during this period..

The immunization programme is a complex one, requiring a close coordination of work between personnel engaged in various tasks at different levels. The tasks must not only be done correctly but also in time in relation to each other. It is, therefore, important that people are not only aware of their job responsibilities, but are well trained and motivated also.

14.7. TASKS OF EPI— SEVEN

Distribute Essential Supplies

In addition to vaccines and cold chain equipments, other supplies are to be procured from higher formation and distributed to the peripheral agencies. The other supplies include—

a) Syringes and needles (separate for BCG)
b) Sterilization equipment

c) Immunization card
d) Forms and register
e) Health education materials
f) Contingency fund for ice, POL, travel expenditure of courier, minor repair of refrigerators.

It has been observed that in many places, same syringe and needle is being used for vaccinating a group of children. This is not recommended. Unless the syringes and needles are properly sterilized, local reactions are likely to occur, which will prevent the expansion of the programme. In addition to examination of other alternatives like use of disposable syringes, hand-operated jet guns, large number of glass syringes and steel needles are to be procured.

The vaccination equipments have to be cleaned and sterilized at the end of each vaccination session each day, so that the staff are ready to begin the sessions next day without any delay. The syringes and needles have to be cleaned, to prepare them for sterilization. Put all the syringes, needles, forceps etc. into a saucepan or pressure cooker. Pour in enough water so that everything is covered by at least two centimeters of water. Put on lid. The water should be boiled continuously for twenty minutes. This procedure indicates the equipments to be supplied for immunization.

Immunization is recorded in the Growth Chart, maintained by some centres. It will be useful, if home-based card (exclusively for immunization or a part of child health) is provided with mothers. This will be an educational tool and assist the health workers to follow up for completing the immunization. Local voluntary organizations may help in providing such *immunization cards.*

In the Family Welfare Programme, it has been approved that, the Miscellaneous Purpose Fund for Sterilization, can be used for such contingencies as purchase of ice, travel cost of couriers, minor repair of refrigerator etc. The officers should take advantage of this provision and use it for supporting immunization programme.

14.8. TASKS OF EPI— EIGHT

Promote Community Participation

The community has to be involved as an active participant in the planning, implementation and evaluation of immunization programme. The health education activities for the involvement of the community can be quantitatively assessed in case of EPI. It is observed that at present only 70% of the children who have taken first dose of DPT and polio vaccine, come for the third doses. This indicates that the mothers who came for the first dose were not properly informed or motivated to complete the dosage schedule. High dropout rate is a major problem for increasing the number of beneficiaries.

In a vaccination coverage assessment survey at Alwar (reported in this book) only 16.2% of children were fully immunized. The drop-out rate from 1st to 3rd dose works out to 33.6% and 25.6% in respect of DPT and polio vaccine respectively. The reasons for not getting the child immunized or not completing the immunization schedule can be classified into three categories—

a.	*Lack of information*			47.8%
	Unaware of need of immunization	—	66%	
	Time and place of vaccination not known	—	27%	
	Others	—	7%	
b.	*Lack of motivation*			17.4%
	Postponed till another time	—	80%	
	No faith in immunization	—	19%	
	Other Causes	—	1%	
c.	*Obstacles*			34.8%
	Vaccination centre too far	—	32%	
	Vaccinator absent	—	16%	
	Child ill-not brought	—	16%	
	Child ill-vaccination not given	—	8%	
	Vaccine not available	—	9%	
	Others	—	19%	

Apart from the formal survey, informal enquiry can be made from the mothers who attend vaccination sessions. They can

explain why other mothers are not attending and would indicate why parents in the area do not participate in immunization activities. It would help to choose better methods of increasing participation.

The health education activities are directed at the health workers, other non-medical professionals and the community at large. Opportunity should be given to the health workers to ask questions and clarify doubts because unless they are clear in their own minds, it will be difficult for them to communicate the information to the public. For passing on simple messages, all members of the health team, including dais, anganwadi workers, community health volunteers should be used. Posters on the diseases and immunization schedule should be placed at strategic points.

14.9. TASKS OF EPI— NINE

Monitor and Evaluate

Monitoring of the programme is done by examination of records and study of reports. The minimum records required to be kept in the immunization programme are—

— record of vaccination by age and dose

— records of cases and deaths

— records of vaccines received and utilised during the month.

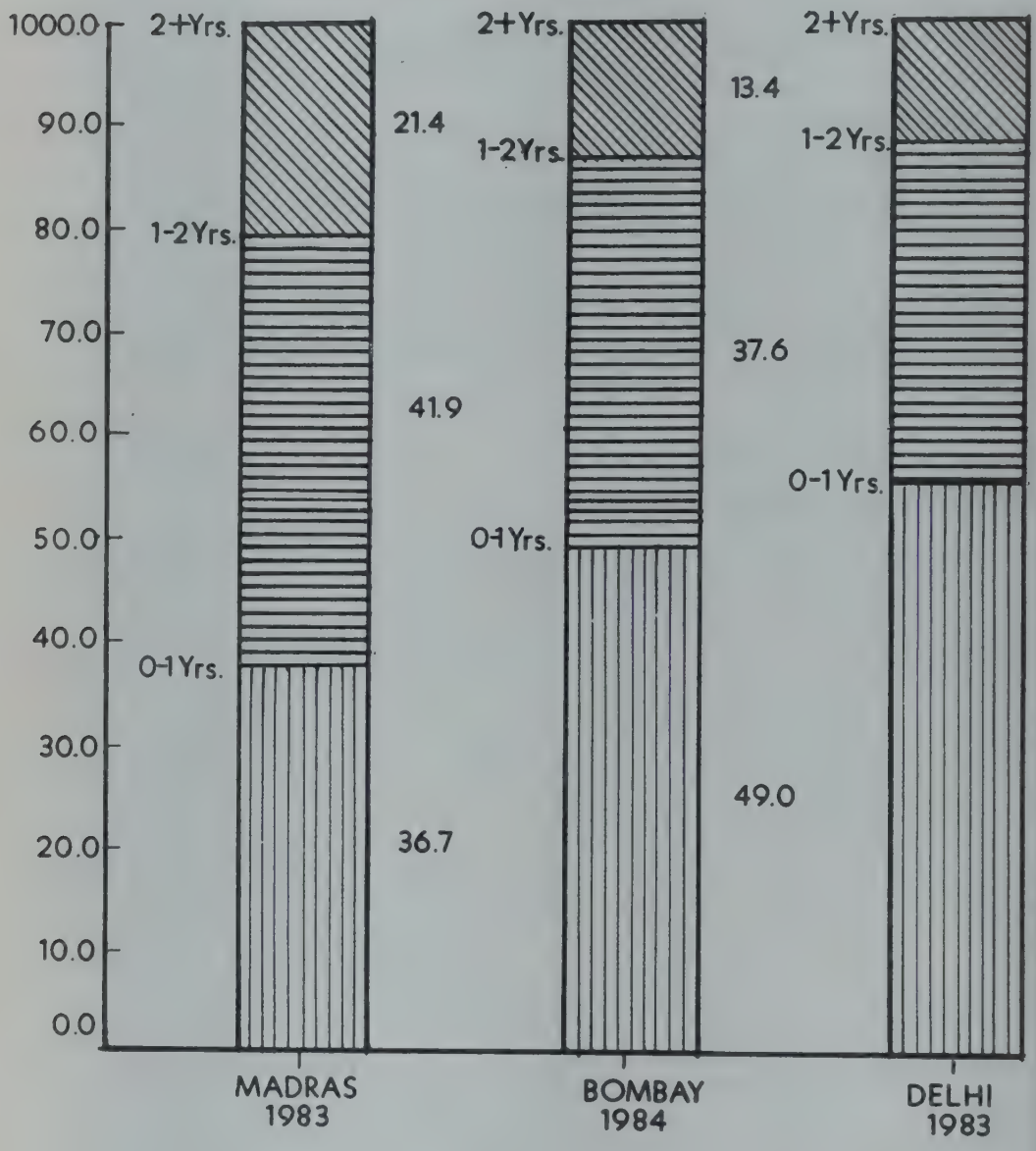
— refrigerator temperature record.

Some of the points that need to be monitored are given below—

Point	*Method*	*Indicator of problem*
1. Number vaccinated	Check register	Achievement less than proportionate target
2. Age at vaccination	Check register Spot checks	More than 10% of the children given BCG, DPT and polio vaccine above 12 months of age.
3. Drop out rate	Check register	Drop out for the first to third dose more than 15%
4. Utilization of vaccine.	Check vaccine stocks	Vaccine utilization less than estimated by performance report.
5. Storage of vaccines.	Check temperature record form Check refrigerator.	Temperature record not maintained. Frequent rise in temperature above 8°C. Thick layer of ice around freezing compartment.

FIG.13.1

CUMULATIVE PERCENTAGE OF AGE GROUP AFFECTED BY POLIO



Samples of polio vaccine (used and unused vials) may be collected from the field and sent to any of the following laboratories for potency tests. The purpose is to monitor the vaccine handling, storage and transport at various levels—

— National Institute of Communicable Diseases, 22-Shamnath Marg, Delhi-110 054.

— Central Research Institute, Kasouli, Himachal Pradesh, 173 205.

— Entero-virus Research Centre, Haffkine Institute, Parel, Bombay-400 0012.

The success of the programme will be evaluated in terms of the coverage of the eligible population with the full course of the vaccines and the impact on disease incidence.

14.10. TASKS OF EPI— TEN

Expand Coverage

The vaccination coverage of the eligible population has to be expanded. A minimum of 85% coverage has to be achieved. This has to be maintained every year, as a continuous ongoing programme. Every year, the new born and pregnant women will join the susceptible population have to be covered as per dosage schedule. This is necessary to show an epidemiological impact. The tendency to immunize higher age group children in the name of clearance of backlog, to get large vaccination performance data, should be discouraged.

Besides ICDS blocks, 30 districts and 50 medical colleges have been selected, where it is aimed to achieve 85% coverage of the eligible population by 1988, the target by 1990 being the country as a whole. There are several other districts and blocks, where additional impacts are available (Area project) which can be identified for accelerated programme activities. High vaccination coverage during a short period of time will lead to a rapid and demonstrable reduction in the incidence of vaccine preventable diseases.

Mobility of the concerned staff is essential for providing coverage in areas remote from the PHCs and the sub-centres. Cooperation and active involvement of the Ministries of Social Welfare, Rural Development. Education, Information and Broadcasting and of voluntary organizations will be sought and

encouraged. At the district level, a committee under the chairmanship of the Collector to oversee the implementation of the programme, will be useful.

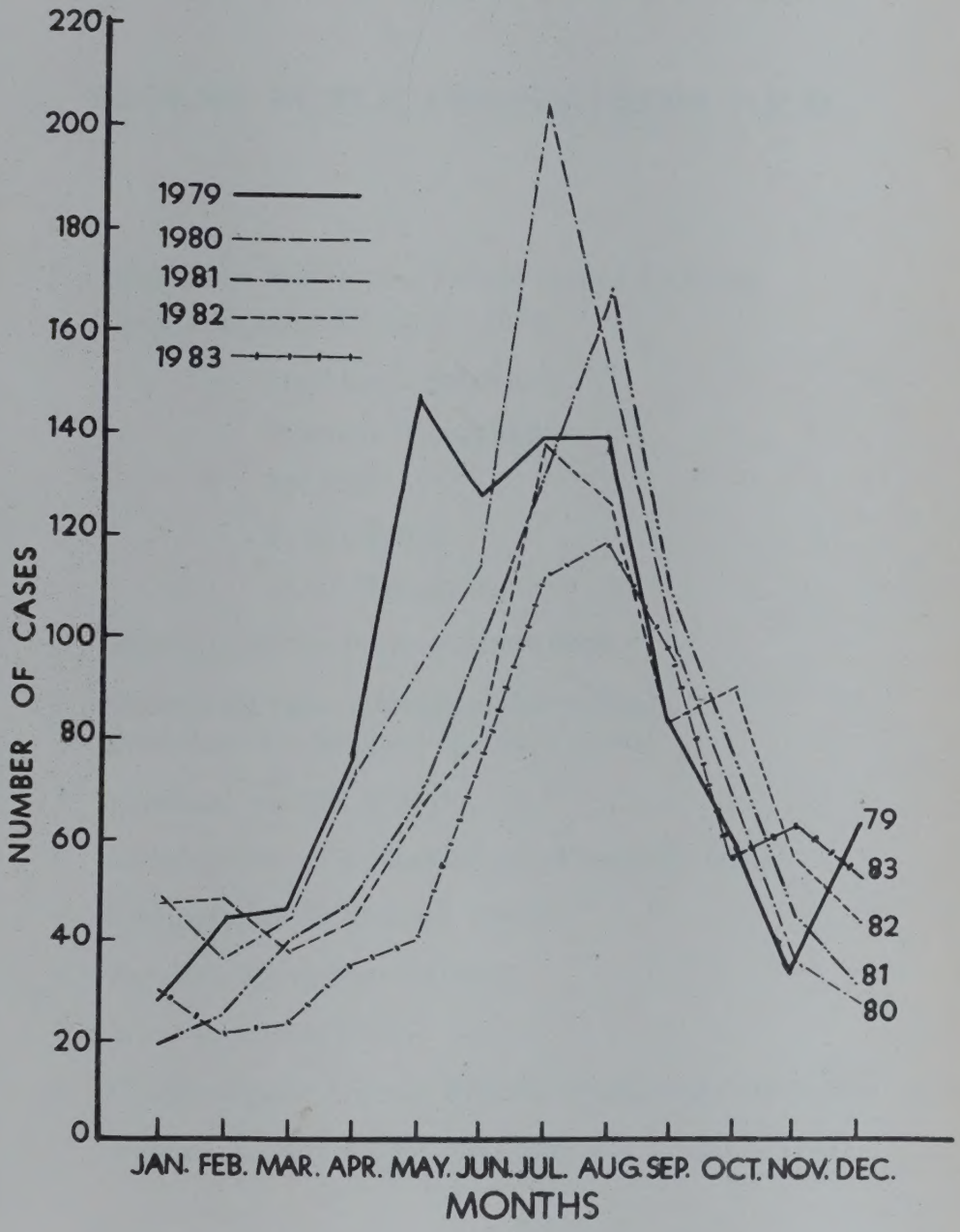
An estimate of number of beneficiaries per district

Estimated total population	15,00,000
Birth Rate (B.R.)	33 per 1000 population
Infant Mortality Rate (I.M.R.)	110 per 1000 live births
Estimated number of pregnant women	(Total Population X B.R. in decimal) - 49,500
Estimated number of infants	(Population X BR X (1- I.M.R.) - 44,055

Campaigns are organized during the winter months in areas which cannot be covered either through the fixed centres or by outreach operations. Teams of health workers move from village to village carrying adequate quantities of the vaccines and other supplies. As for the outreach operations, prior ground work must be done to make the exercise a success. In both these situations, repeat visits have to be arranged (interval not less than one month). Efforts should be made to hold the sessions on the fixed days in case of outreach operation and pre-announced day, in case of campaign.

FIG. 13.2

MONTH-WISE DISTRIBUTION OF POLIO CASES IN BOMBAY (1979-1983)



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